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The electrification of part of the Rochester division of the Erie, which is described in detail elsewhere in this issue, is in some respects more interesting than some of the larger electrification schemes which have received so much attention recently because the road is typical of 75 per cent. of the railroad mileage in the United States. It is single track road running through an agricultural country with a large city at one end and a few small towns along its route. The steam passenger service before electrification consisted of three trains each way a day between Mt. Morris and Avon, and six trains each way been Avon and Rochester. There were only four stops for trains between Avon and Rochester, 19 miles, and five between Avon and Mt. Morris, 16 miles. The electric trains have 28 stops, 22 being flag stations. There are now eight trains each way a day between Mt. Morris and Rochester, and three additional trains each way between Mt. Morris and Avon, connecting with through steam trains to and from Rochester. The all-important question "Does it pay?" is best answered by the following statement of passenger revenue between Rochester and Mt. Morris for the two months of July and August in 1906 before electrification and in 1907 after electric operation was begun on June 27:

Month.	1907.	1906.	Increase. Per cent.
July	$14,175.72	$10,735.20	34
August	15,317.00	11,461.68	34

In these red-lettered times curious are some of the anomalies that arise in the relations of the railroads to civics and politics. In Massachusetts one of the two great parties has just split in twain ostensibly, at least, over the question of the merger of the Boston & Maine system, and has furnished the first instance of a great party schism on such an issue in the nation's annals. Or traveling westward in the trail of Dean Berkeley's star of empire one finds the fledgeling state of Oklahoma and her new constitution. Oklahoma is in that condition of newness, when, if the historical precedent of the other far western states were worth anything, she should be craving railroads and trolleys at any price and leaving corporation baiting to a future when there would be more corporations to be baited. But under the force of the pervasive epidemic she puts two cent passenger fares into her organic law, provides an elective commission and gives it power to regulate public service charges. Yet she veers also toward virtue by adopting a constitution that prohibits stock watering. Here again, by contrast with another commonwealth we find a paradox. Oklahoma, youngest of the states, sets her cherubic face sternly against corporate hydraulics. But how many weeks have passed since the legislature of Connecticut, after two centuries and three-quarters as colony and state and in late years a sufferer from trolley overcapitalization, overruled some 20 vetoes of her Governor aimed at precisely that evil? The new and the old state have each ratified policies exactly the reverse of what would be inferred from civic experience, railroad history and antecedent conditions. Verily when our times are written up by the men of a new era they will find some things that turn logic upside down and make shriek theories of human motive and conduct.

"Alarm and resentment" are felt among trainmen in Canada because, it is said, the Government is too active in prosecuting conductors and enginemen on criminal charges in connection with collisions; and deputations of trainmen from a half dozen prominent cities have been to the Attorney-General with a protest. The plea of the protestants is that the men who have been brought before the courts are not criminals but have only committed errors of judgment. The action of the Government is said to be producing a general "feeling of nervousness." The Attorney-General is quoted as saying that the statutes will or should be changed so that some of the weight of the law will fall on men "higher up." Everyone must sympathize with these nervous trainmen, for it is true that in most cases "error of judgment" is a correct description of offenses of the kind referred to. But these errors produce such terrible results that society has defined them as crimes. This is a crude way of curing the evils aimed at but it is the best that the legislatures have yet discovered. To get an idea of the attitude of people generally on this subject, let any trainman imagine his own wife or mother killed in a collision in Europe or Mexico caused by the "error of judgment" of some trainman. As long as the right or trial by jury remains, however, we cannot believe that any trainman will be punished very severely in America for errors of judgment; for it is always easy to show that other persons, either fellow employees or men "higher up," contributed to the mistake. Juries are disinclined to punish one man when others equally guilty cannot be reached. Unfortunately, too, a good many errors amount to gross negligence, for which the dullest man has no excuse, howsoever strong may be the charge against the superintendent or the fellow employee. But, while the trainman usually can make but a poor show of being oppressed, society on the other hand may well ask whether such a situation as that in Canada does not evidence a deplorable inefficiency in the law. Errors of judgment are not cured or prevented by criminal laws. Gross negligence is not usually punished, even if a clear case is proved. Producing a state of nervous-

ness does little if any good, and it may do much harm, for trainmen need to be calm. The only rational way to make conductors, enginemen and others adequately careful is to apply the slow, detailed methods of good discipline and instruction which educate men to carefulness. Abundant experience has shown the futility of everything else. Canada will do well to turn attention to the officers, as distinguished from employees, if it can thereby make progress in the discipline and training of men; but it is not likely to find a criminal statute an effective means to this end.

Equipment depreciation and renewal is the subject of a careful study of practical equipment accounting by William Mahl, head of the accounting departments of the Union Pacific System and the Southern Pacific Company, which is printed on another page. It is a particularly important subject at this time, when the Interstate Commerce Commission has under consideration the final rules to be adopted for maintenance of equipment accounts. Mr. Mahl speaks out of an experience unusual in length and opportunities for studying accounting problems at first hand. His argument is based on the uniform practice of the Southern Pacific Company since 1890. As against any theoretical system of depreciation he puts himself on record as follows from his 17 years' experience in direct management of equipment maintenance and renewals:

"There has been a fairly approximate average annual charge for equipment vacated per locomotive or per car in service. This charge fixes a unit by which an estimate may be formed of the extent to which a railroad company is making good the depreciation of its equipment. There will be as much difference among the railroads in this charge for depreciation as there is now in the average cost per annum for maintenance of way and structures per mile of road, or for the average cost of repairs per locomotive or per car per annum—in fact, in any cost of operation, and rightly so, because the conditions are not alike on any two properties.

"Appreciating all the difficulties and cost which the keeping of the equipment accounts as contemplated by the commission will impose upon the railroads without any practical compensation therefor, it is to be hoped that the commission will amend its rules by omitting altogether the provision for "Depreciation," and amend the provisions for "Renewal" to represent the current cost of replacing all equipment vacated. This change will furnish the commission with reliable data about the depreciation which has been carried into the operating expenses of the railroads and enable it to order adjustments suitable to each case if any should be necessary."

Mr. Mahl believes that all practical purposes which the Commission has in separating the equipment account into three divisions, "repairs," "renewals" and "depreciation," can be accomplished by employing the two divisions "repairs" and "renewals" as has been done by the Southern Pacific Company for many years. By this system the current cost of replacing the particular type of locomotive or car vacated, less the scrap value, is charged to operating expenses, and this same amount, together with the cash received as the scrap value, credited to a replacement fund, which is used to pay for new equipment of whatever capacity and design bought. In this way the integrity of the capital account "equipment" is maintained, while the actual depreciation during the year is made good from the year's income. The cost of new equipment beyond the amount to the credit of the replacement fund is, of course, charged to capital account. This method is based upon the value rather than the number of the equipment which as the dollar is the general unit of railroad accounting is the more accurate method. Mr. Mahl believes that under this system equipment is adequately maintained over a series of years with the greatest simplicity in accounting methods. The Commission's purpose in planning its new rules is admittedly to find out whether each railroad is under-, over- or exactly maintaining its equipment, facts which obviously cannot be determined from the information which has been furnished by many railroad companies in the past. Yet, if all railroads made as careful returns on this subject of equipment maintenance as do the Southern Pacific and the Union Pacific, would it not be possible for the Commission to arrive at this same information as accurately as by requiring the additional division of "depreciation" in the equipment account, particularly as the percentage of the original cost of equipment which should be set aside as depreciation is as yet entirely undetermined?

FREIGHT CLAIMS.

The suggestion recently made in these columns that the freight agent at every large station should be competent to handle damage claims as skilfully as the general claim agent himself (or, what is just as good, should have a clerk experienced in that work) is being carried out on one large western road, and we are informed that the good results of the change are already manifest. In some cases there is a marked improvement in celerity as well as in the quality of the work done, for most agents are overworked and they sometimes leave claims correspondence unattended to for days.

From this time forward the settlement of freight claims is also likely to be bettered materially, so far as interline claims are concerned, by the time-limit rule lately adopted by the Freight Claim Association. This went into effect September 1. It provides that:

"Settling carrier shall investigate claim to establish validity and apportion liability.

"Inquiry may be addressed direct to agent of interested carrier whenever practicable, and to the freight claim officer only after failure to obtain information from agent, or when necessary from nature of inquiry.

"When agent of another carrier fails to answer within 20 days from date of inquiry, copy of inquiry, with request for reply, shall be sent by express, postal mail, or messenger, to freight claim officer of delinquent carrier. When answer is not received within 30 days to such request or to a direct inquiry to freight claim officer regarding a paid claim, paying carrier may, provided liability is not in its opinion located, charge full amount of claim to delinquent carrier, or if there are two or more delinquent carriers, then to delinquent carrier nearest paying carrier in direction of destination, and shall forward all papers relating to the claim to such delinquent carrier, who shall take the place of settling carrier, and make further investigation and distribution of amount of the claim."

We understand that the majority of the member roads have accepted this rule. It will be observed that the maximum time a claimant must now wait to get his money is 50 days, or, adding the time used up in "lost motion," say two months. This is much better than the indefinite delays, months long, to which he has been compelled to submit heretofore. This should be a welcome improvement to claimants, and help greatly in promoting the friendly feeling for which the conscientious claim agent strives.

In discussing, on August 9, this matter of using all legitimate means to secure and retain the friendliness of patrons, it was suggested that small claims which appeared to be valid, or that were presented by reputable people, be paid at once, without subjecting them to the delay incident to an investigation. In commenting on this point in a later issue, Mr. Calkins, Freight Claim Agent of the New York Central, suggested the possibility of a violation of the interstate commerce laws in following such a practice. That, it seems to us, can easily be avoided. In fact some roads already follow such a policy. They get around the difficulty mentioned by inserting a proviso that should the amount, upon investigation, prove incorrect, adjustment will be made by payment of the difference by the party benefiting in the first instance. We understand that, as a rule, claimants willingly repay the excess where investigation shows they have received too much, thus manifesting their appreciation of the practice. It would be legal, we should think, to insert in bills of lading a clause reserving the right to disregard exact equity in settling small claims. There would be no violation of substantial equity—or at least none worse than occurs unavoidably in hundreds of freight transactions every day—and the law should approve what equity approves.

Aside from the effect which a policy of promptness has in making friends for the road, it has another important advantage in lightening the burden on the claim office machinery by reducing the number of claims awaiting settlement. For example, one Chicago road of about 9,000 miles usually has in its claim offices in course of settlement about 10,000 claims, and every day 700 to 750 new ones are filed. To lighten this load would tend to lubricate the whole clerical machinery of the freight department.

The number of small claims is greater now, proportionately, than ever before. For this several causes are responsible. One is the new severity of the interstate commerce law. Under the old conditions the enjoyment of rebates and other special privileges caused the favored shipper to overlook small losses and damages in many instances; or, more properly, not to regard them as losses. But the abolition of these pleasant conditions, in conjunction with the present agitation and general feeling against railroads has changed this attitude, and shippers and consignees now find causes for filing claims which formerly they failed to notice at all. As a further result of these conditions, bureaus and agents making a business of soliciting doubtful claims for collection have become much more active. They even take up claims long outlawed by the statute of limitations. A further factor is the latter-day practice of large industrial concerns having traffic officers, who give special and constant attention to the matter of freight claims. All this, of course, necessitates largely increased forces in the claim offices and elsewhere, and greater expense to the roads.

The longer a claim is delayed in settlement the more inertia it seems to accumulate and the greater its effect in clogging the office machinery; so that whatever may be the reasons why claims are numerous the only sure way for the claim agent to keep them out of his dreams at night is to take care that they do not remain on

his hands over night; out of hand, out of mind. In thus striving to promote his own peace of mind, he is taking the best means of promoting the interest of his employer.

PENALTY IN CORPORATE MISDOING.

The unprecedented condition of the affairs of corporations which has come to pass during the last twelve-month, attended by a shrinkage of some $3,000,000,000 in gross market values of securities, especially of railroads in this country alone, has naturally given rise to many theories of causation. Some point to the world-wide character of the symptoms. But in that larger analysis they only deepen a problem which is perplexing the best statists of Europe. Limiting the case to an overland one finds three theories foremost. One is the excess of business over capital. Another is the interference of federal and state authority with forms of active capital, notably that form invested in railroads; and a third is the abuse in the employment of capital. The more rational view of the situation undoubtedly includes all the last three causes annexing the fourth, or world cause, as an outside influence, though one not to be ignored in times when great trading nations are closely tied in fiscal bonds. But with the latter cause, when it comes to remedial theories, we have not much to do, at least not through the agency of federal or state lawmaking save as affected by the customs tariff and questions of reciprocity.

In the search for remedies the question of penalty for corporate misdoing is becoming one of growing prominence and of not decreasing difficulty. The difficulty rests on a double base: First, there is the complexity of the statutes themselves and the mazy procedure of courts which ill-define responsibility and befog the application of the penalties. But the worst obstacle is what one may call the unjust incidence of the penalty. A railroad corporation violates a federal law relating to discrimination in rates and is fined heavily. Upon whom does the penalty fall? Upon the managers? Not at all, save as it may operate as a moral and deferring force. Does it fall upon the corporation? Only as an intermediary organism. In its final and practical incidence the penalty descends upon a body of stockholders scattered, unorganized, unresponsible for the penalized act and innocent as unborn babes. In the domain of nebulous and impossible statistics it would be interesting if we had returns that would show how much of the recent shrinkage of $3,000,000,000 in securities had fallen upon the directly and indirectly guilty, how much upon the guiltless and guileless. We do not know; but that the innocents carry all but a small fraction of the loss is a statement that stands with its own saying.

For some of the railroads technically at fault there must also be offered a minor plea in abatement. Let us illustrate by a familiar and general fact that involves a principle. In this country there are a considerable number of believers in the extreme doctrine of free trade. They hold all protective tariffs in the nature of a governmental crime invading the natural rights of the individual. But, bitterly as they may hate protection, they do not advocate any sudden dash into free trade. They have seen the federal government in partnership with a system which, unjust as they believe it to be, has fostered industries which have a right not to be ruined by a catastrophic and abrupt change of tariff policy; and, it may be added, the government would be seriously and justly blamed were it to adopt any such radical change. But in its attitude, action and policy toward railroad corporations has not the federal executive and legislative branches adopted just such a sudden and calamitous shift? By their lethargy, their lax enforcement of existing law, their executive and statutory lapses did they not stimulate the very misdoing which they now, in a sudden revergence of virtue, seek to undo; and were railroad corporations and managers, finding the federal authority thus in a kind of tacit partnership with an evil, so much to blame as if the same authority had been consistently assertive? To state legislation and its enforcement the same illustration applies. Not until many moons after the fact did even law-abiding Massachusetts invoke its own laws on the subject of street railway consolidation; other states are still sleeping on their statutes; while many other commonwealths have just wakened too suddenly, revived dormant laws and passed others too severe, which, in the main, fling upon the far away and innocent stockholder the burden of any corporate misdoing.

All this is now in the past tense, except as it may modify penalty for earlier guilt. The real question, in the case of corporate violation of law, is the fixing of penalty hereafter to fit both the crime and the criminal. The strong tendency of opinion to-day is obviously in favor of the personal instead of the corporate penalty; the reaching down of punishment through the person to the corporation, but so as to apply the corrective without punishing the stockholder; and, in the case of distributive responsibility for offence, the rigid application of the legal maxim that he who commits crime through others is a criminal himself. Yet even here one finds another of those resistants which technical law—to the confusion of laymen—seems perpetually opposing to practical justice. How long is it since the federal government itself and its executive head, so hot foot now after corporate evils, urged successfully in a rebate case that the prosecution—and, of course, any consequential penalty—must lie against the railroad corporation and not against its manager who happened in the meantime to have become a cabinet officer? That matter of individual responsibility must be clarified in the courts before the theory of personal penalty can be established and applied. But in that direction it now seems as though public opinion, later to be crystallized in law, were slowly outworking. It will almost certainly be the alternative remedy if the penalty, laid on the corporation, proves inadequate as a check.

It will, of course, be urged—in fact, if we are not mistaken, has been urged by President Roosevelt himself—that the suffering of the stockholder when his corporation is punished is a natural and inevitable incident like the hardship of a blameless family when the father is convicted of crime. But in public aspects the cases vary widely. In the one case the penalty visits the real offender, in the other not only non-offenders in the corporation penalized, but of other corporations that are innocent. It is the difference between a limited and specific application of law to an individual crime with immediate civic benefit and the penalizing of a vast group of law-abiding citizens with immediate financial—and public—injury. The immediate injury may, of course, in the end be beneficent as a cure of corporation ills. But the policy is a painful one shot through with the ills of the blameless investor and reaching such a dimension of fiscal calamity that the remedy, even if effective in the end, begins to seem worse than the disease. It rests with our lawmakers and our juriscults of the higher type to discover the way in which corporate misdoing may be penalized without a fine of $3,000,000,000 on the nation and without the visitation of the sins of the guilty few upon the heads of the guiltless many.

New York, New Haven & Hartford.

The New York, New Haven & Hartford Railroad property has, in its swift evolution during the last three or four years, become perhaps the most interesting of the railroad systems of the land. Its earlier traditions of arch conservatism have been supplanted by a policy of bold advance. It occupies a peculiar situation territorially and in its industrial environment. It is positive, not to say assertive, in its relations with the other great roads. It has branched out greatly in its marine business and stands as a pioneer and leader in taking and operating street railway lines on a great scale. Its swift pace, fiscal and physical, however varies one obstacle in any analysis of its annual report. So fast is it making history that annual returns three months old so antedate later facts of importance as to have a savor of the antique. One hardly catches sight of President Mellen's observation car before it has disappeared in the distance. But by joining his annual report with the events of the months next following the fiscal year one can get an impressive view of a picturesque railroad landscape whether seen in detail or entirety.

The very first entry of the report, "earnings from passenger department $26,758,929," has its pith of meaning. Early in the year 1906 Mr. Mellen announced a progressive reduction of passenger rates to two cents a mile on his system. The new rate was to begin on some of its branches in western Connecticut, work eastward and finally take in the whole system, the through New York-Boston rate reduction coming last and beginning with November of 1906. The regular fiscal year ending with June 30, 1907, covers seven months during which this reduction has applied to the New Haven's full mileage (2,006), and for five months, averaged, has applied to the major part of it. The official forecast, based merely on the passenger business of the fiscal year 1905-6, showed a loss, as now recalled, of some $700,000. Instead of such a loss passenger earnings have risen $1,506,805, or from $25,252,124 to $26,758,929—and this with an additional track mileage of less than four miles and upon a system where the use of mileage books at the two cent rate had been exceptionally large. Even allowing for normal increase of regular passenger business and somewhat for development of excursion traffic, the results of the reduced rate as applied to a system with dense passenger travel is extremely vivid and striking. It seems singular that President Mellen has not emphasized this matter in his report until one remembers that there are some re-

versed interests as regards the two cent rate in his own board of directors.

Taking up first the operating results of the steam system alone there is to be noticed the persistency with which passenger receipts jostle those from freight, a feature which demarcates the New Haven among the larger railroad systems of the country. The passenger department brought in $26,758,929 as stated; the freight department $28,386,704. The difference between the two was $1,627,775. In the previous year the difference was $1,994,994. The natural volume of the New Haven's huge passenger business between New York and Boston and reaching laterally the living centers of population in southern New England thus begins again to expand and tend toward overreaching new traffic on freight lines of the system like the Highland division and the increased through freight business. In a remote way it goes to justify the phrase of an old-fashioned New Haven director years ago who extolled the passenger business as "freight which handled itself" as contrasted with the freight which had to be handled. The net earnings from operation of the steam road, $17,751,854, tally very strikingly with the $17,761,735 of the year before. Here the New Haven feels the now trite railroad story of increased cost in operation, of labor and materials and, in its case, as a debtor road in car demurrage, there is to be added the higher per diem charge. Actual operating expenses increased from $35,222,586 to $37,850,081. While gross earnings increased about 5 per cent., operating expense ran up to an increment of about 7 per cent., though the rise in operating ratio from 66.477 per cent. to 68.073 per cent. is not so impressive in those figures. For reasons to be stated later this ratio of operating expense is a matter to be watched closely. This year the net earnings from operation only of street railways ($3,615,899), obviously considerably offset in the interest account, and earnings of the steamship lines together with minor income carry total income to $24,080,755, which fixed charges reduce to $8,893,041 net. Crediting the company with dividends on stock owned by subsidiary companies the surplus over dividends is $1,988,053 compared with $3,718,285 the year previous.

Looking closer into the dividend payments it will be seen that the fiscal year's last quarterly dividend of 2 per cent. was paid on $121,878,100 of capital stock, of which $24,797,700 is held in the treasury of subordinate companies of which the New Haven owns all the stock. It seems to be practically the same as regular treasury stock. But if all this stock is issued, the net income of the main company from all sources of $8,893,041 lacks $957,207 of meeting the then dividend requirement. This minor text brings to the foreground the whole subject of the maintenance of future dividends which in some quarters, spite of Mr. Mellen's repeated denials, has been questioned and which, in connection with the coming issue of new stock to the potential amount of about 354,600 shares, has served to depress the market value of the outstanding shares. Such an issue, if made in full and in the hands of the public, would add nominally $2,836,800 more to the dividend requirement.

But just here come a long series of very important offsets. The company, by its figures in the report, holds 109,948 shares of Boston & Maine stock for which its own shares to an equal number were issued in exchange. The number of Boston & Maine holdings since the end of the last fiscal year has probably been somewhat increased. But taking them as they stand in the report the treasury stock looks very much like a block to be used chiefly in the final liquidation of the Boston & Maine merger, at least as a matter of present or past intention. But whether that particular group of shares is used in the merger or not, that merger by exchange means an addition of $1 per share instead of $8 to the dividend requirement, and would add to it but about $190,000 instead of $1,520,000, reducing the dividend requirement by the difference, or $1,330,000. This would leave a balance over dividends of about $373,000 on outstanding capital of $121,878,100 and reduce to say $2,500,000 the increased requirement when all the forthcoming stock is issued, which will not be until July 1, 1909. In time alone the company since the close of the last fiscal year will thus have had two years in which to fill that fiscal gap.

But there are yet other factors more concrete than mere time. It is true that the fixed charges of the company, especially those represented by leases and interest, have very greatly increased. Those two items for the last fiscal year show an increase of $4,396,203, which at 4½ per cent. capitalizes into a principal of about $98,000,000. At the special stockholders meeting May 31st of the present year, only a month before the close of the fiscal period, President Mellen stated that the amount of money spent by the company during his adminisration of about 3½ years amounted to about $157,000,000. Probably about $10,000,000 have been added since. Of this about $100,000,000 have gone into securities of other companies; about $40,000,000 into new equipment, real estate, additional tracks and the electric plant on the lower New York division; and the remainder of about $27,000,000 has been spent in positive physical improvements, advances to leased lines, the insurance fund and other forms of capitalization. As to the investments in securities of other companies President Mellen stated officially some months since that $97,750,000 were paying the interest on their cost—in other words one financial hand was washing the other. As illustrations may be taken the Ontario & Western investment of $13,105,185, costing about $45 a share and returning $1.50 per share; the original investment of some $10,000,000 in the New Haven city street railway system returning $400,000 a year, more than covering $350,000 a year of interest on the debenture purchase bonds; and many purchases of the shares of dividend paying subsidiary roads. Of the remainder investment of say $67,000,000, some of it denotes forthcoming profit and some does not; but much the larger fraction falls into the former category, notably the new trackage above New York, betterment of roadbed, removal of "funnels" like that at New Haven, and the new bridges, all carrying out the Mellen Northern Pacific policy of increased train-load and soon to be available after tying up much capital for several years. To the same class of agencies for future business belongs the purchase of new rolling stock, now coming in rapidly and which includes some 17,000 cars and 137 locomotives, all of the up-to-date standard—additions which have a direct bearing hereafter on a solution of the acute car demurrage controversy.

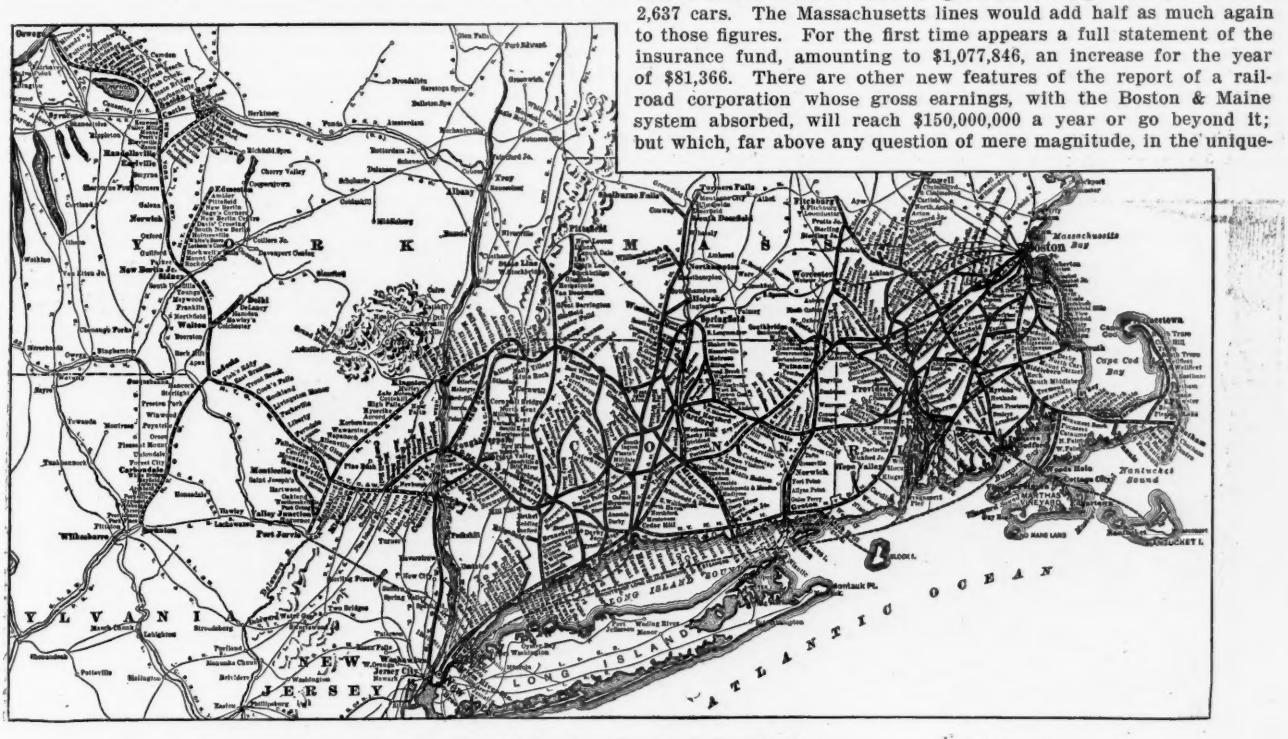
An impressive example of the tied up capital of the company soon to be released and give returns appears in the Central New England account which is published in the report. In the year 1905, before the New Haven secured control of the line its gross earnings were $979,439. In 1906 under New Haven control the earnings had risen to $1,679,449, and the last report now shows their increase of $2,153,366. To the operating expenses of the Central New England ($2,584,413) are charged the high cost of the repair of the Poughkeepsie bridge resulting in a balance deficit over all of $380,499. The early completion of work on the bridge—costing in all $1,500,000—must shift this deficit into a handsome surplus on a property out of whose total securities of $11,630,500—bought at a very low price—the New Haven owns $9,280,623. Indeed the coming prosperity of the line is such that the New Haven faces a somewhat irksome problem in settling with the minority holders before the regular policy of consolidation can be applied to the property.

To meet, then, an increased dividend requirement rising progressively up to the mid-year of 1909 to about $2,500,000, the New Haven should have (1) increased net revenue due to higher train load and diminished ratio of operating expense, and (2) largely increased income from investments non-productive heretofore and immediately to become productive. Besides fresh operating efficiencies such sources of added income as the Central New England, the coast line traffic, increase of business of the electrics, New York terminal electrification and new trackage may be cited as well as the closer welding of the whole system into an operating unity. The adverse factors of the future in the situation are three. One is prospective expenditure for improvements of the Boston & Maine when taken in. A second is the minor one of the Morse steamship rivalry; and a third, of much more importance, is recession of "prosperity" which would quickly affect the industrial conditions of New England. This last is the only real cloud athwart the New Haven's horizon otherwise all but clear. If the business for which the New Haven has been for years preparing does not come the general "recession" will find the New Haven, along with the other railroads of the country, with a good deal of "hay out," to use the rural term. But it will be in a better position to face the emergency than most of the great railroad systems. And the company has never been in a position calling for very serious enforcement of economies, a fact which suggests larger latitude for that purpose, albeit the economies might have to be brought out through some labor troubles.

The situation summarized shows the New Haven in the position of the farmer whose fields are just ripening for the harvest after his capital has been put into the planting and culture. That the necessity will arise of reducing dividends, allowing for every possible adversity, seems a contingency very far removed indeed.

Three other topics of the report are of prime interest and import (1) the electrics, (2) the Boston & Maine merger, and (3) the policy of centralization. Taking up these subjects in the order of their immediate moment, the report drops the old head of the Consolidated Railway Company, the holding corporation now technically non-existent, and there is substituted a statement of "earnings and operating expenses of street railway lines" respectively $10,638,057 and $7,022,158, with a balance over operation of $3,615,899. These returns are very incomplete. They do not include full figures for the year on the Connecticut and Rhode Island systems; and they exclude entirely the returns on some 550 miles of electric trackage in Massachusetts, including the Worcester, Springfield and Berkshire systems; nor do the fixed charges above operation appear in the report to show net loss or gain. The facts are that the New Haven Company now owns or controls street railway lines in Connecticut, Massachusetts, Rhode Island and New York state with a trackage of almost exactly 1,500 single-track miles; with capitalization in market values certainly not less than $100,000,000; gross earnings yearly of about $16,000,000; and probably a deficit of some

magnitude as indicated by the words: "A deficit in the returns from their operation was estimated to result for a short term immediately following the acquisition" of the Connecticut Railway & Lighting Company's plant and the Rhode Island trolley system. The technical fiction of non-ownership still excludes the Massachusetts lines from the returns. But it is to be hoped that, as soon as possible, for the information not merely of shareholders but of the world, this great venture of a steam railroad corporation into street railways may be kept as a separate entity and its results, physical, financial and operative, be set forth fully. It is unique in the annals of transportation and of world wide interest and value especially now that it is reaching out into the express and freight business and has vast potential interblendings of steam and electric service. The same clarified and separative treatment should



New York, New Haven & Hartford.

characterize the annual returns of the navigation properties of the company now much expanded and covering new coast line business.

In his official references to the Boston & Maine merger Mr. Mellen repeats in substance his recent public utterances. The situation may be tersely stated: Out of some 300,000 Boston & Maine shares of capital stock outstanding the New Haven Company now holds through trustees probably not less than 120,000—enough for moral, if not practical, control, and sufficient also to check absolutely any future control of the Boston & Maine by rival railroad interests. In the difference of dividends of the two companies the New Haven is paying $120,000 a year which may be called the price—and a low one—of its present position of vantage; and it is saving $180,000 a year by postponement of the merger and exchange of the remainder of 180,000 shares of the Boston & Maine. Hence a "stand pat" attitude of the New Haven company awaiting the subsidence of the political tempest in Massachusetts and the dominance of reason over the frothy rhetoric of platforms and the stump.

The New Haven's broad and deep policy of centralization of properties and separate corporations goes on apace stretching in all directions of its many and diversified interests. During the fiscal year seven lines, steam and electric, were merged in the parent corporation, including the Providence Terminal and the Boston & New York Air Line, and there have been other important mergers since, including the first steps in the consolidation of the maze of holding companies of the Rhode Island trolley roads. The ultimate, still on the horizon, is absolute unity and centrality. It has the disadvantage of disguising the losses and gains of some of the branch interests of the great and complex system, but, provided it leaves clear the workings and outcomes of the electric and navigation properties, the policy spells simplicity, new economies and is sane railroading.

Other features of the report are suggestive and some of them new. The schedule of physical improvements and their stages, some 43 in number, fill alone two pages and a half and index the coming economies by operating efficiency. They include the Harlem six-track construction, the costly improvements at New Haven, Providence and Waterbury, the Highland division new tracking, with its tunnel between Terryville and Bristol, the elimination during the last year of 27 grade crossings, the Readville repair shop completed, the New York division electrification and other improvements too many to be rehearsed. Incidentally may be mentioned the failure to sell more than $4,000,000 of the preferred 4 per cent. stock of the New England Investment & Security Company except at unadvisable prices; the acquisition of the coast steamship properties; and—though not referred to in the report—the extended option of the New York Central on the Ontario & Western at purchase price not likely, for obvious reasons, to be taken up. The description of the street railway lines owned and leased in Connecticut and Rhode Island alone shows a single-track mileage of 951 miles and 2,637 cars. The Massachusetts lines would add half as much again to those figures. For the first time appears a full statement of the insurance fund, amounting to $1,077,846, an increase for the year of $81,366. There are other new features of the report of a railroad corporation whose gross earnings, with the Boston & Maine system absorbed, will reach $150,000,000 a year or go beyond it; but which, far above any question of mere magnitude, in the uniqueness of its policy and problems is an economic object of absorbing interest.

Annexed are the principal results of the year's operation and the change in the summaries of the general balance sheet:

	1907.	1906.
Mileage worked	2,006	2,056
Passenger earnings	$26,758,929	$25,252,124
Freight earnings	28,386,704	27,247,118
Gross earnings	55,601,936	52,984,322
Maint. way and structures	5,479,089	5,614,978
Maint. of equipment	5,638,784	5,668,524
Operating expenses	37,850,081	35,222,586
Net earnings	17,751,854	17,761,735
Net income	8,893,041	10,185,377
Balance sheet total	374,770,119	239,486,335

Atchison, Topeka & Santa Fe.

The Atchison, Topeka & Santa Fe again comes forward with a year's record of tremendous progress. That the record of the road since its reorganization in 1896 is nothing short of marvelous is no news, but it is a fact which is constantly receiving added proof. The development has been well rounded, harmonious and general. Not only earnings, gross and net, and surplus for dividends have increased—this last from about $50,000 in 1897 to over $21,000,000 in 1907—but the mileage and influence of the company have been constantly spreading over new sections of the southern half of the great territory west of the Mississippi river and, along with this, the standards of excellence in permanent way have been rising. To-day the Atchison instead of being a lightly built and ill-maintained collection of roads from Chicago to a point nearly 500 miles short of San Francisco, with branches mainly in the bankrupt state of Kansas and in Texas, little more prosperous, is a splendid through route from Chicago to Los Angeles and San Francisco, all the way over its own rails, with thousands of miles of branches and feeders in Kansas—now most prosperous, Texas—a fast-growing empire in itself, the new state of Oklahoma, New Mexico, Arizona and California. Instead of being several hundred miles south its interests extend to the north of San Francisco,

where it has during the last year, together with the Southern Pacific, organized the Northwestern Pacific Railway to carry on railroad development in the coast country of northern California. That its policy of expansion is still under way, may be judged from the fact that on June 30, 1907, the company had under construction and nearly ready for operation, 488 miles of new railroad.

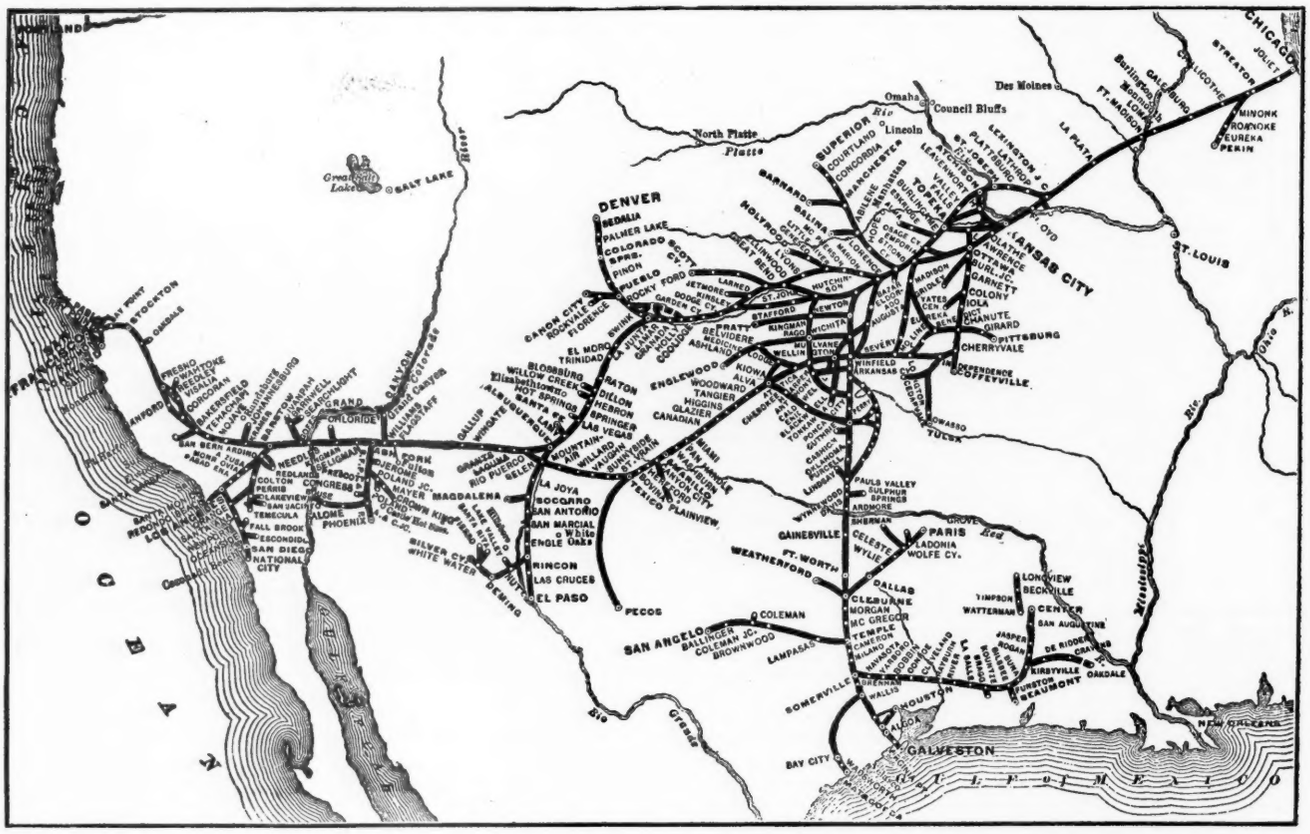
It is not to be supposed that the growth in earnings has been only as fast as the growth in mileage. Gross earnings in the year ended June 30, 1897, with 6,444 miles operated, were $30,600,000, or $4,752 per mile of road. Last year the operated mileage had increased to over 9,200 and gross earnings to $93,700,000, or $10,103 per mile of road. This is the first time that gross earnings per mile of road have been $10,000 or over. This 11-year comparison shows not only the great gains in earnings which have come from new lines and new territory, but also the very much greater earning power of the old lines.

The earnings' increases during the last year were large. Passenger earnings rose to $21,200,000, which lacks little of the total freight earnings of the 1897 year, and is an increase of $2,500,000, or 13 per cent. over the previous year. Freight earnings rose from $56,500,000 to $65,500,000, a gain of $9,000,000, or 16 per cent. Mail, express and miscellaneous earnings together increased about $1,400,000. Altogether this makes a total increase in gross earnings of $12,900,000, or 16 per cent.

Operating expenses were $8,900,000 larger than in 1906, of which increase $5,500,000 was in conducting transportation and $2,300,000 in maintenance of way and structures. This left net earnings of $34,800,000, as against $30,800,000 the year before, an increase of $4,000,000, or 13 per cent.

Fixed charges and taxes took about $1,000,000 of this increase. The net income, therefore, was about $3,000,000 larger than in 1906. The dividend rate was 4 per cent. in 1906; the first semi-annual payment in 1907 was 2½ per cent., and the second, 3 per cent., so that the common stock is now on a 6 per cent. basis. Owing to these increases in the dividend rate and an increase of $1,000,000 in the amount of common stock outstanding, the year's dividend payments were larger by about $1,500,000 than in the year before. A new policy was used—or rather a more complete application of an old one—in dealing with the surplus after dividends. This was about $7,950,000 in 1906 and $9,800,000 last year. In 1906, in addition to a small appropriation to the fuel reserve fund, $4,500,000 was set aside for improvements written off, leaving a surplus of $3,200,000 to be carried to profit and loss as the year's final surplus. Last year, besides a similar small appropriation to the fuel fund, $9,600,000, or almost the whole of the surplus after dividends was set aside for improvements, leaving only a nominal final surplus for the year to be carried to the profit and loss account. This is in sharp contrast with the action of the Chicago & North-Western, for instance, which this year abandoned its years-old policy of making a direct appropriation for betterments out of current income. The Santa Fe made what amounted to a further income appropriation by writing off from the book value of "railroads, franchises and other property," $200,000 in cash, the net profits of land sales from the Santa Fe-Pacific land grant, a transaction which does not appear at all in the income account. The total expenditures chargeable to capital account, were $24,200,000, but the deductions out of income reduced this capital charge for the year to about $14,000,000.

The Santa Fe analyzes its maintenance expenditures in some detail. Maintenance of way as a whole, increased faster than the increase in mileage operated, so that the maintenance expenditure per mile of road was considerably larger last year than in the year before. As recently as 1902 only $782 a mile was so spent. This had risen to $1,479 in 1906, while last year $1,648 was spent per mile of line. The maintenance of way cost was largely increased by extensive relocation and reconstruction to reduce grades and curvature. Where, in carrying out this process, parts of the road as originally built were abandoned the cost of construction of the railroad or property abandoned was charged to maintenance of way, while only the additional cost of the new construction was charged to capital account. To state definitely the method followed in such particular circumstances is an exceedingly desirable feature of a railroad report which the Santa Fe has long fulfilled.



Atchison, Topeka & Santa Fe System.

The increase in maintenance of equipment was about $850,000. Including a proportion of unlocated maintenance of equipment expenditures chargeable to superintendence, shop machinery and tools, stationery, and other expenses, the unit maintenance costs were $3,037 per locomotive, against $3,101 in 1906; $963 per passenger train car, against $887 in 1906, and $103 per freight car, against $104 in 1906. The same expenditures per revenue freight car mile were exactly the same in the two years, while per locomotive mile and per passenger car mile they were considerably larger. Working out the cost of repairs and renewals according to our usual method, the maintenance cost per locomotive was $2,623, against $2,695 in 1906; $830 per passenger car, against $772 in 1906, and $89 per freight car, against $90 in 1906. These equipment maintenance charges are liberal, particularly as the Santa Fe is generally recognized to have an unusually efficient shop organization.

With an increase of 16 per cent. in revenue freight ton-miles there was an increase of 9 per cent. in both freight-car and freight-train mileage, while the average revenue per freight train mile

increased 6 per cent. The average revenue train load was 320 tons, a gain of 6 per cent. The average carload increased in the same proportion. For the first time in the history of the road the average haul per ton of freight was over 400 miles, having increased from 394 miles to 403 miles during the year. The ton-mile earnings were larger by a very slight percentage.

The passenger earnings, as already mentioned, showed a large increase. With 12 per cent. more passenger miles, the passenger car and passenger train mileage each increased 6 per cent., as did the average passenger revenue per passenger-train mile. These figures all show a large increase in the business with a greater economy in handling it.

Almost all classes of freight tonnage increased, the principal exceptions being corn, packing house products other than dressed meats, stone and sand, and forest products other than lumber. There was a large increase in tonnage of agricultural products carried, which rose from 24 per cent. to 25 per cent. of the total tonnage. Two large increases, one under this head, suggest the effects of some of the new extensions as well as the general development of the company's territory. The new lines in Texas must be responsible for part of the increase in the tonnage of cotton, which rose from 176,000 tons in 1906 to 419,000 tons last year. Similarly, the Arizona & California branch from the Ash Fork-Phoenix line west to the Colorado river—a region rich in minerals—must have brought some of the increase in tonnage of ore and bullion which rose from 385,000 tons in 1906 to 530,000 tons last year.

Several new lines were opened for traffic during the year. The Arizona & California has now been extended to Parker, on the Colorado river, 107 miles from its junction with the Phoenix line. It is to be carried across the river and northwest to a junction with the main line at Bengal, Cal. The branch from Barnwell, Cal., to Searchlight, Nev., 23 miles, was opened for traffic on April 1. The line from Kiowa, Kan., via Medicine Lodge, to Belvidere, 49 miles—originally projected as an extension of the Denver, Enid & Gulf, which is now operated as part of the system—was finished during the year. The easternmost extension of the system south of Kansas City, the line from Kirbyville, Tex., eastward, has been put in operation as far as Cravens, La., 57 miles, and track laying is in progress beyond Cravens to Oakdale, La. The branch from Canyon City, Tex., to Plainview, 57 miles, was opened for traffic February 18, 1907. Two small railroads in the beet sugar district of the Arkansas valley in Colorado were bought during the year. They had 68 miles of line in operation at the close of the fiscal year.

Most important of all the new construction was the completion of the Belen cut-off from Texico, N. Mex., west to Belen, 250 miles. Its extension from Belen to Rio Puerco, 19 miles, is nearly finished. Heavy work is now in progress to reduce grades and curvature of the line between Texico and Wellington, Kan., the connection on the east of the new cut-off. By June 30, 1908, it is hoped to transfer all of the transcontinental freight business to the new low-grade line thus created, via Wellington, Texico, Belen and Rio Puerco.

The Phoenix & Eastern Railroad, which runs from Phoenix east along the Gila river to Winkleman, about 100 miles, was sold during the year to the Southern Pacific Company at cost and interest—$2,190,176. Against this there was a net amount of $1,554,474 spent for securities of the Northwestern Pacific Railroad, besides advances of $451,985 to the Grand Canyon Railway.

There were offered to the shareholders by a circular dated May 1, 1907, $26,056,000 of a new issue of 10-year 5 per cent. convertible bonds, a higher interest rate than on previous convertible issues. The stockholders subscribed for $9,943,000 of these and the remaining $16,113,000 was sold to J. P. Morgan & Co. As these transactions took place in July or later, they do not appear in the accounts of the year. The need for issuing these bonds is evident from the item of cash on the balance sheet, which stood at $17,300,000 a year ago, against $8,200,000 on June 30, 1907. In contrast with many other companies it is notable in this connection that no notes or bills payable of the Santa Fe or of any of its auxiliaries are outstanding.

President Ripley sums up the business of the year and the outlook for the future, the latter in an unusually brief and clear presentation of the facts of the present business situation as affecting railroads. His remarks on these two subjects are quoted in full as follows:

The year was one of extraordinary business prosperity. The rapid colonization of the southwest, the bountiful crops, the discovery and development of mineral deposits and the growth of miscellaneous business, due to the general increase of wealth, all contributed to the increase of traffic on your lines. At times the increase in the volume of traffic was so large that the company's equipment and other facilities were overtaxed and it became impossible to move traffic promptly and satisfactorily. The congestion of traffic on some of your lines and the necessity of moving traffic as speedily as practicable without regard to economy of operation, caused a material increase in operating expenses. On the other hand, climatic conditions were unusually favorable. Your company has begun the new year with its properties in excellent physical condition and with largely increased equipment.

In order to enable the railroad companies of the United States to furnish the additional transportation facilities required by the rapid growth of the country in population and business activity, it will be necessary to expend many hundred millions of dollars of additional capital. The power of the railroads to obtain this additional capital has been greatly impaired by loss of confidence of investors in the stability and security of railroad investments; and this loss of confidence has been caused, in great measure, by the unfriendly attitude of a large part of the public, and by the arbitrary action of legislatures and railroad commissions in reducing rates and imposing burdensome restrictions, often without investigation or consideration of the consequences.

The public, apparently, has failed to appreciate that capital invested in railroads yields very moderate returns, having regard to the prevailing rates of interest and to the profits upon capital, employed in other kinds of business; and the public, also, has failed to perceive that the whole country is interested in maintaining the prosperity and financial credit of the railroad companies. Few companies in the United States have been more prosperous than your company. Yet even during the year ending June 30, 1907, which was the most prosperous year in its history, net earnings averaged but 6.5 per cent. on the entire capitalization, which is believed to be not in excess of the cost of reproducing your company's properties at the present time. Interest and dividend payments for the year averaged less than 4.6 per cent. on your company's bonds and stocks. For the last 10 years the average net earnings were but 4.82 per cent. on the entire capitalization and the average interest and dividend payments were but 3.71 per cent. on the bonds and stocks. Even these results could be obtained only through the expenditure of enormous sums for construction of extensions and for improvements and additional equipment. During the last 10 years the sums so expended for improvements and additional equipment and for new construction, without counting further large sums expended in purchasing previously constructed branches and extensions, amounted to more than $110,000,000, while the aggregate sums paid to the holders of the preferred and common stock amounted to less than $75,000,000.

It is hoped and believed that the public will soon realize that its recent attitude toward railroad companies in general has not been just to their stockholders and bondholders, and also that unless the confidence of investors in the security and stability of railroad investments is restored, it will be impossible to obtain the additional railroad facilities which are necessary to the development of the country. Under existing conditions, however, your directors have deemed it prudent to suspend various extension projects which were contemplated, and to limit the company's capital expenditures to the completion of improvements to which the company is already committed.

The results for the last two years are given below:

	1907.	1906.
Mileage worked	9,273	8,434
Passenger earnings	$21,171,629	$18,677,817
Freight earnings	65,500,309	56,506,587
Mail, express and miscellaneous earnings	7,011,468	6,616,606
Gross earnings	93,683,407	80,801,010
Maintenance of way and structures	15,286,063	12,949,812
Maintenance of equipment	11,779,847	10,932,033
Conducting transportation	29,538,964	24,089,628
Operating expenses	58,867,901	50,008,485
Net earnings	34,815,506	30,792,525
Net income	21,168,724	18,268,170
Dividends	11,363,723	9,786,910
Betterment appropriation	9,791,226	4,718,985
Year's surplus	13,776	3,227,314

The figures for the fiscal year ended June 30, 1906, are not the same as shown in the last annual report, but are revised to cover lines of the system as now constituted.

Boston & Maine.

Long the railroad ruler of northern New England, itself a consolidation of consolidations, the Boston & Maine is likely soon to be joined with the New York, New Haven & Hartford in a railroad merger which will unite most of the railroads of all New England. To quote President Mellen, of the New Haven, in the annual report of that road printed on another page, "The Boston & Maine is probably as little competitive and is more supplementary and complementary to our system of roads than any other railroad property with which we are now engaged in business." The two roads fit naturally into each other at a succession of different points, and the consolidation, if it comes about, should be of great value to New England in unifying its through lines of transportation.

It was in last February that the first definite rumors came that the Boston & Maine was likely to pass to the control of some other road. For a time it appeared that the New York Central & Hudson River was to be the purchaser. Its annual report issued late in April showed that the Vanderbilt company had invested in over $500,000 Boston & Maine stock. Besides this the American Express Company, controlled by the Vanderbilts, held $3,000,000 stock of the New England road. Soon, however, the burden of probability turned to the New Haven and the *Railroad Gazette* of May 17, 1907, crystallized these rumors into a semi-official prophecy. The final announcement of the facts came early in June through publication of correspondence dated June 4 between Governor Guild of Massachusetts and President Mellen.

The present status of the merger is that the New York, New Haven & Hartford owns not quite $11,000,000 of the $28,000,000 common stock of the Boston & Maine, or a little less than 40 per cent. This amount of stock has already been exchanged for an equal amount of New Haven stock so that the Boston & Maine stockholders who have made the exchange are now getting 8 per cent. instead of 7 per cent. dividends. Meanwhile the whole matter is

held up until next year by the law passed last June forbidding, until the next legislature acts, any further steps toward carrying out the merger.

If he gets control, there is no doubt that President Mellen will apply his well-known "Northern Pacific" policy of general improvement to the Boston & Maine. It needs it. The Boston & Maine is not to-day a first class modern railroad in roadbed or equipment. It has many steep grades on its northern lines, little double track, and is not well ballasted. Some of its locomotives and cars are modern and efficient but a great many of the equipment numbers are filled with antiquated rolling stock. By the end of this year only 286 miles, or about 13 per cent. of the lines, will be block signaled, although the work of equipping 881 miles more at an estimated cost of about $1,000,000 has been begun and is to be completed within three or four years. As a result the road has recently had two or three destructive passenger train wrecks. The annual report of a year ago specifically stated that the lack of needed facilities for locomotive repairs had during recent years become so acute that some of the locomotive repair work was done at outside shops at excessive cost, while at times of special wear and tear, locomotives, badly needed, were kept long out of service while awaiting their turn for repairs in the company's own overcrowded shops. Work was to have been begun last April on the new shops, but the present report does not show that anything further has been done toward providing these needed facilities.

There is one simple ratio, a touchstone of the efficiency of railroad operation, which sums up in itself, directly or indirectly, the Boston & Maine's weaknesses. This is the proportion of gross earnings which is used in the essentially non-productive expense of conducting transportation. Conducting transportation cost on the Boston & Maine last year was 50.6 per cent. of gross earnings, or as much as the Great Northern and Union Pacific managed to get along with in 1906 to cover their total of regular operating expenses, general expenses, maintenance of way and maintenance of equipment, besides conducting transportation. A fairer comparison is the New Haven property with its similar situation and traffic. Conducting transportation in 1907 required 45.5 per cent. of gross earnings on that road—which is considerably less than 50.6 per cent. The Boston & Maine can hardly be, naturally, a more expensive property to operate, for although it suffers from somewhat more severe winter weather, it has nowhere nearly as high a proportion of passenger traffic—whose conducting transportation costs are high, if the statements of railroad managers about the unprofitableness of the passenger business mean anything—as the New Haven, on which passenger traffic makes up nearly one-half of the total. Furthermore, on much of its passenger business the Boston & Maine charges from 2¼ to 3 cents a mile, while 2 cents a mile is the uniform highest rate on all lines of the New Haven system. The meaning of the conducting transportation proportion on the Boston & Maine is not hard to grasp. Half of all the money that is spent for operation produces no lasting result. It may be entirely necessary for a man in moderate circumstances to spend half of his income on food and lodging; for a great railroad it is wasteful and inefficient.

An idea of the character of the northern Boston & Maine lines may be gained from a pamphlet published nearly a year ago dealing with the New Hampshire mileage of the road. Its criticisms may not all be just but they are at least suggestive and not disproved by the general impression gained from traveling on the road in that state. This statement showed that of the 1,100 miles of main track in New Hampshire only 81 miles have second track; that there were few block signals; that there were on the average 48 ft. of wooden bridges per mile, and that as recently as 1905, 27 out of 39 bridges rebuilt were rebuilt of wood; that grades were prohibitive of economical operation; that there was no rock ballast; that passenger-train service was little better than 10 years ago; that mail service, particularly newspaper trains, was very poor; yet that the passenger rate in New Hampshire was 3 cents a mile, against 2¼ cents in Massachusetts.

In general the facts of the case appear to be that the Boston & Maine is in very much the same situation as was the New York, New Haven & Hartford four years ago when President Mellen came to it from the Northern Pacific. The New Haven then had not kept up to the times in improvements to the line and in new equipment and in consequence its operation was inefficient and expensive. All this has to-day been changed and is still further being changed so that the New Haven is becoming more and more efficient as a transportation machine. It is, of course, as yet an open question whether the absolute merger of the two roads will meet with general public approval and be carried out, but if it is, it is safe to say that by the application of similar methods to the Boston & Maine, similar successful results can be obtained from that property.

There are two striking facts in the record of last year's operations on the Boston & Maine; one is the great increase in the cost of operation, the other the fact that, although the total traffic increased, the tonnage of 32 out of the 42 groups of commodities listed decreased. Under the first head, conducting transportation increased by over $2,150,000, the operating pay roll alone being $1,800,000 greater than in the preceding year. Under the second head there were decreases in tonnage of the following classes of traffic:

Agricultural implements	Lime
Brick	Live stock
Bark	Meats, dressed
Boots and shoes	Metal, bar and sheet
Coal, anthracite	Mill products, other than flour
Cement	Ores
Coke	Packing house products—except dressed meats.
Cotton	Petroleum and other oils
Domestics (cotton and wool)	Poultry, game and fish
Flour	Rails, iron and steel
Fruit and other vegetables	Stone, sand and other like articles
Furniture and household goods	Sugar
Grain	Tobacco
Hay	Wines, liquors and beers
Hides and leather	Wool
Iron, pig and bloom	

The increases in tonnage were in the following:

Coal, bituminous	Naval stores
Ice	Paper
Lumber	Potatoes
Merchandise	Wagons, carriages, tools, etc.
Miscellaneous	Wood pulp.

The total tonnage, not including company coal, was 21,765,551 tons, against 21,050,054 tons in 1906.

Gross earnings for the year were $41,100,000, against $39,200,000 in 1906, a gain of just under $2,000,000, or 5 per cent. Of this increase about $1,500,000 was in the earnings of the freight department. The gross earnings per mile of road increased from $17,419 to $18,282.

There was a decrease of $478,000 in maintenance of way and structures and an increase of $225,000 in maintenance of equipment. Per mile, maintenance of way cost $2,144, against $2,353 in 1906. Repairs and renewals cost $1,275 per locomotive, against $1,235 in 1906; $425 per passenger car, against $365 in 1906, and $50 per freight car, against $56 in 1906. These maintenance of equipment figures go far to bear out the statement that the road's equipment, as a whole, is not up to modern standards. They are small for each class of equipment. There must be taken into account, however, the $742,000 spent out of operating expenses for new equipment. Capital account was charged with over $4,000,000 during the year for additional equipment and contracts have been made for still more locomotives and cars to cost $4,500,000. All of these are to be delivered by the early spring of 1908. The large expenditures of these two years for new motive power and rolling stock should go far to bring up the general standard of the locomotives and cars.

Conducting transportation expenses are listed in more detail than by most companies. It has been said that both the Boston & Maine and the New Haven are in reality, from a freight standpoint, nothing more than switching roads for New England as a great manufacturing center. It is suggestive that while $955,000 was spent for freight engineers and firemen, $531,000 went to engineers and firemen of freight switching locomotives. In the same way fuel for road freight locomotives cost $2,400,000, against $1,000,000 for fuel for freight switching engines. The cost of switchmen and yardmen was almost exactly the same as that of all road engineers and firemen, passenger and freight. The cost of fuel has greatly increased during the year, from $4,500,000 in 1906 to $5,300,000 last year. In general, wage payments to freight employees have increased more than to passenger men. The expense of $408,000 for crossing tenders suggests the large number (and incidentally the good protection) of grade crossings. There was $660,000 spent during the year in doing away with these, making a total net expenditure for elimination of grade crossings to June 30, 1907, of $3,800,000. The terminal character of much of the road's mileage is again suggested by the item of freight station service for which $2,300,000 was spent, against $2,000,000 in 1906. The Boston & Maine has to bear a heavy burden in the matter of per diem charges. The freight car service expense was $945,000 last year, against $841,000 in 1906. The expense of advertising during the year increased nearly 75 per cent., due in part, no doubt, to the coming to the road of a new and aggressive General Passenger Agent. Taken as a whole the proportion of conducting transportation to gross earnings greatly increased; from 47.6 per cent. in 1906 to the 50.6 per cent. last year.

The average net earnings per revenue train-mile have slowly but steadily decreased during the last four years. From 49 cents in 1904 the net return has been one cent less each year until it stands at 46 cents in 1907. The average passenger journey is 18 miles, which shows how the commutation travel around Boston overshadows the through business. The Boston & Maine, except for its Boston-Portland lines, lacks the great strength of the New York, New Haven & Hartford in having a through line between two very important cities, or a long through line with heavy travel.

The company owns two electric railroads; one, the street railway at Portsmouth, N. H.; the other, the road from Concord, N. H., to Manchester and Penacook. Together they have 46 miles of line and carried 3,500,000 passengers last year.

There was an increase in the freight haul from 89 to 99 miles during the year. It would be interesting to know exactly what caused this change. Judging from the tonnage statistics, it was probably due more than anything else to the movement of bit-

uminous coal. The bituminous tonnage increased from 1,700,000 tons to 2,400,000, a gain of 40 per cent., and it is probable that at the same time a longer haul was received.

The greater cost of operation is perhaps most accurately seen by the increase in the average cost per locomotive-mile. Averaged against this unit, fuel cost 16.4 cents, against 14.9 in 1906, and wages 7.7 cents, against 7.3 cents; the total cost per mile run was 31 cents, against 29 cents in 1906. On a total of 32,700,000 locomotive-miles, this average increase of 2 cents a mile means a great deal.

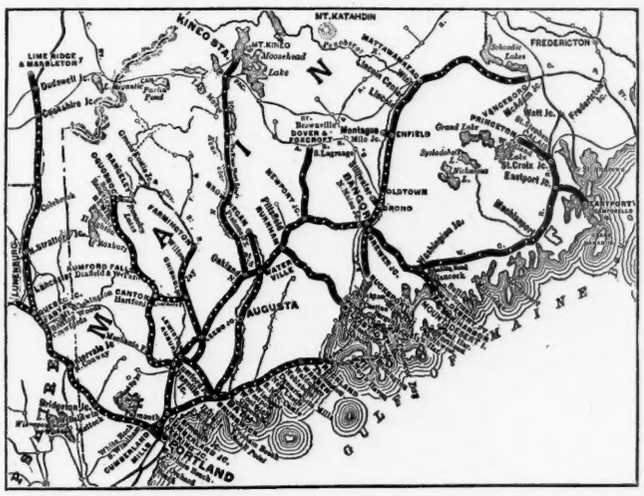
One-year 5 per cent. notes were issued during the fiscal year which, on June 30, stood at $3,700,000. These have just been refunded by an issue of $4,000,000, one-year 6 per cent. notes. The reason the company makes such short term note issues which in consequence bear a higher rate of interest, is that the approval of the Massachusetts Railroad Commission is necessary for a security issue which is to run more than one year.

The principal results of operation were as follows:

	1907.	1906.
Mileage worked	2,228	2,228
Passenger earnings	$13,584,164	$13,291,584
Freight earnings	25,212,843	23,717,913
Gross earnings	41,125,257	39,214,203
Maint. way and structures.	4,905,227	5,383,302
Maint. of equipment	3,564,246	3,339,013
Conducting transportation.	20,830,959	18,665,030
Operating expenses	30,226,729	28,276,941
Net earnings	10,898,528	10,937,262
Net income	3,340,865	3,128,347
Betterments and new equipment	1,234,918	1,076,427
Year's surplus.	132,615	217,274

Maine Central.

The Maine Central, which is controlled by the Boston & Maine through ownership of over 50 per cent. of its capital stock, owns all of the Maine mileage in the Boston & Maine system north of Portland, and, in addition, a line from Portland through the Crawford Notch of the White Mountains to a connection with the Quebec Central, just south of Lime Ridge in the province of Quebec. During



Maine Central.

the past year it has been extending its control of the railroads of Maine, where it already owns most of the railroad mileage. The Somerset Railway, 90 miles long, running from Oakland to Moosehead Lake, was acquired in March by purchase of $650,000 of its $736,649 capital stock. The road has not been merged with the Maine Central but is separately operated for the benefit of its owners. Since assuming its control active measures have been taken to properly complete and equip the property, and it is believed that in the not distant future its passenger and freight traffic will so develop that it will not only be self-supporting, but increasingly valuable as a feeder to the Maine Central.

There have also been acquired the Portland & Rumford Falls properties, consisting of the Portland & Rumford Falls and the Rumford Falls & Rangeley Lakes railroads. These roads run from Rumford Junction, near Auburn, Me., to Rumford Falls and Livermore, where there are already large manufacturing industries, and also from Rumford Falls to the Rangeley Lake region. They have been leased for 999 years at an annual rental of $328,000. The lease is given in full in the report. By it the company comes in possession of the franchises of the Indian River Railway, a company organized to build from the Maine-Quebec line to Megantic, Que., on the Quebec Central and the Canadian Pacific. This, with an extension of the Rumford Falls & Rangeley Lakes from Oquossoc north to the boundary, would give the Maine Central a short connection between Portland and these two Canadian roads. Such a line would considerably shorten the rail distance between Quebec and Portland. The Maine Central also comes in possession of valuable terminal property and privileges at and near Portland by this lease. The new acquisitions are already more than self-supporting and are likely to increase in value with the development of water powers and industries along the Androscoggin river.

The last year was a prosperous one for the Maine Central. Gross earnings were $8,400,000, against $7,800,000 in 1906, an increase of $550,000. Of this, $178,000 came through the passenger department. Operating expenses, however, increased sharply. The pay rolls for the year amounted to $3,286,000, or 39 per cent. of gross earnings, against 36 per cent. in 1906. This was an increase of $511,000, or nearly 20 per cent. over the pay roll expense of the previous year. Net earnings were $3,200,000 against $2,600,000 in 1906, an increase of 23 per cent. Net income increased even faster, by 42 per cent. Both of these increases, however, are a good deal due to the fact that, following the Interstate Commerce Commission ruling, in 1907 all additions and betterments, amounting in that year to $724,000, were separately reported and deducted from surplus after dividends instead of being included in operating expenses as in 1906. As no figures for 1906 corrected to show comparisons with the new methods are given, it is not possible to tell how much of the increases in net earnings and income are due to this cause. The principal item under additions and betterments is $369,000 for new equipment.

The Maine Central shows an even greater increase in cost per locomotive mile than the Boston & Maine, from 27 cents in 1906 to 30 cents last year. This was due particularly to increase in cost of fuel and wages. The maintenance of way expenditure was $1,274 per mile against $1,940, a very large decrease, due partly to the change in accounting method. Even the present figure seems reasonably liberal in view of the fact that a good many of the lines run through sparsely settled regions and have thin traffic. The heavy winters, however, require many expenditures on the line which roads in more southern regions do not have. It is evident that the Maine Central has in the past been building itself up out of earnings.

Coal, grain, lumber, paper, potatoes, wood and wood pulp, besides merchandise and miscellaneous, furnish the principal articles of tonnage. The largest item of traffic is lumber; the next, wood. Lumber, wood and wood pulp together make up 1,788,000 tons out of a total tonnage of 5,537,000 tons. The average trainload was 280 tons.

The principal results of operation were as follows:

	1907.	1906.
Mileage worked	931	816
Passenger earnings	$2,708,004	$2,572,796
Freight earnings	5,024,116	4,657,399
Gross earnings	8,348,139	7,794,745
Maint. way and structures	1,076,193	1,483,408
Maint. of equipment	2,223,441	1,872,039
Conducting transportation.	1,563,129	1,483,980
Operating expenses	5,149,529	5,205,059
Net earnings	3,198,610	2,589,686
Net income	1,748,412	1,232,614
Betterments and new equipment	1,238,949	828,027
Year's surplus	161,094	56,218

Illinois Central.

A spirited contest is under way for control of proxies at the annual meeting of the Illinois Central next Wednesday. This contest is between E. H. Harriman through J. T. Harahan, the present President of the company, and Stuyvesant Fish, who until last November had for 20 years been President. Four new directors are to be elected. Of the directors whose term expires, Mr. Harriman is one and Mr. Fish another. The contest will center about the re-election of these two men. Mr. Fish appeals to the stockholders for proxies largely on the ground that complete domination of the Illinois Central by the Union Pacific and the Southern Pacific is threatened, which as the Illinois Central is a north and south line originating more business than it receives, would be to the disadvantage of the Illinois Central shareholders. It is not necessary to go into the other charges which he brings against the present management of the road, as it is not possible from the facts which have been made public to form a fair judgment as to their truth or importance.

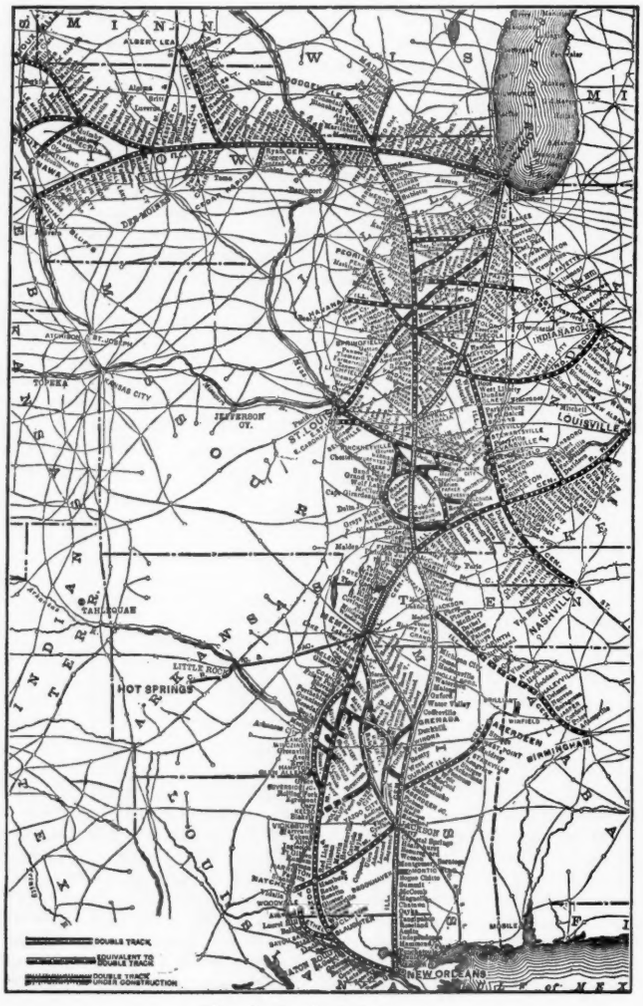
The southwestern railroads are the ones which are showing by far the largest increases in gross and net earnings for the past year. While the Illinois Central is not exactly a southwestern road, nevertheless, its position as the premier through line to the Gulf should give it a large share in the great prosperity of that region. It owns considerable mileage north of St. Louis, earnings on which would not be directly affected by the southwestern prosperity, but most of the mileage south of St. Louis should feel the result of this unusual growth. For this reason the increase of 10 per cent. in gross earnings seems smaller than might have been expected. Gross earnings of Illinois and Iowa railroads in general increased as much as that during the last year, while the increases on the southwestern mileage might reasonably have been considerably larger. Even on the Yazoo & Mississippi Valley, which operates the bulk

of the southern lines, the increase in gross earnings was only 10 per cent.

Nevertheless, the year's results were satisfactory, for in spite of an increase of 10 per cent. in operating expenses, net earnings were 8 per cent. larger than in the 1906 twelvemonth; gross earnings per mile of road increased 11 per cent., and net earnings per mile of road increased 10 per cent.

Operating expenses as a whole were larger by $3,500,000 than in 1906, of which increase $1,900,000, or 25 per cent., was in maintenance of equipment and $1,600,000 or 9 per cent. in conducting transportation. Maintenance of way decreased slightly in the total; per mile operated it was $1,568 against $1,550 in 1906; repairs and renewals cost $2,122 per locomotive against $1,944 in 1906; $775 per passenger car against $819 in 1906 and $92 per freight car against $67 in 1906—this last a large increase.

No specially noticeable gains were made in economy of operation. The revenue train load increased only 3 per cent., from 353 to 364 tons; car loading increased by less than 1 per cent., and net earnings per revenue train mile increased only 4 per cent.



Illinois Central System.

against the increase of 10 per cent. in net earnings per mile of road. With an increase of 6 per cent. in revenue ton miles there was an increase of 3 per cent. in the freight train mileage. Eleven per cent. more passenger miles were handled with an increase of only 5 per cent. in passenger train mileage. Freight earnings per train mile increased 7 per cent. and passenger earnings 3 per cent.

The balance sheet shows that the company needs to borrow money soon, for there was on June 30, 1907, $10,300,000 in bills payable at future dates outstanding, against $1,400,000 a year earlier. This increase represents money borrowed for construction expenditures on the Indianapolis Southern, Yazoo & Mississippi Valley, and the Nashville and the Birmingham extensions and terminals. Against a total of $11,860,000 payable at future dates, the company holds some $29,000,000 par value of bonds free in its treasury. The current assets exceed the strictly current liabilities by $3,200,000, although there was on June 30 only $1,000,000 cash on hand. Both in order to provide more working capital and to finance the large construction expenditures, the Illinois Central will evidently be one of the first railroads to come in the market for new funds as soon as there is an improvement in the demand for railroad securities.

The line to Indianapolis was put in operation last December. It was described in the *Railroad Gazette* of March 15, 1907. The line to Birmingham, Ala., is to be ready for operation by the first of November. Other new construction is a double-track branch from Kensington, Ill., to Hammond, Ind., seven miles, one of whose tracks will be used jointly with the Chicago, Cincinnati & Louisville, giving that road its permanent Chicago entrance, and the other as an electric line by the Chicago, Lake Shore & South Bend, which in return is to give to the Illinois Central trackage rights from Hammond to the United States Steel Corporation's new plant now building at Gary, Ind. A double-track freight line, 16 miles long, is being built around the city of Memphis, Tenn. The Illinois Central has also advanced $120,000 to a company through which the 10 railroads entering Memphis are together building a union station.

The Yazoo & Mississippi Valley, which operates a network of lines in the Mississippi delta as well as the western of the two through lines from Memphis to New Orleans, in all 1,239 miles of line, had gross earnings of $9,500,000, an increase of 10 per cent.; operating expenses of $7,800,000, an increase of 10 per cent., and net earnings of $1,800,000, a gain of 8 per cent. Revenue train load increased from 282 tons to 318 tons or 3 per cent.; while there was a decrease of 9 per cent. in the ton-mile rate and of 2 per cent. in the net earnings per revenue train mile. Maintenance of way cost $1,793 per mile, against $1,810 in 1906 and $1,354 in 1905. There was an increase of 30 per cent. in maintenance of equipment cost.

The following table sums up the operation of the Illinois Central, not including the Yazoo & Mississippi Valley, for the last two years:

	1907.	1906.
Mileage worked	4,371	4,424
Passenger earnings	$11,187,533	$10,004,041
Freight earnings	38,033,271	34,637,124
Gross earnings	56,610,633	51,636,405
Maintenance of way and structures	6,851,450	6,855,173
Maintenance of equipment	9,596,007	7,705,028
Conducting transportation	20,213,508	18,568,355
Operating expenses	37,847,707	34,302,477
Net earnings	18,762,926	17,333,928
Net income	11,687,091	10,862,339
Betterments	3,987,934	4,164,739

Brooklyn Rapid Transit.

The Brooklyn Rapid Transit Company did not make quite as favorable a showing for the year ended June 30, 1907, as in the three years previous. It is not yet in a position to pay dividends on its $45,000,000 stock and probably will not be for some years to come, but meanwhile it is accumulating a large surplus and spending money freely for permanent improvements.

There was a decrease of $116,068 in net earnings and the surplus after all charges was $1,658,444. Last year only $1,090,840 was carried over to surplus, $500,000 having been deducted for contingent reserve fund, a deduction which was not made this year. Gross earnings were $19,381,587, an increase of $908,259, or 5 per cent. In 1906 the increase in gross was 13 per cent., in 1906 11.1 per cent., in 1905, in 1904 and in 1903, 6 per cent. The sudden falling off in growth of gross receipts is due in part to further extensions of the transfer privilege during the year. Of the 511,839,437 passengers carried, 26 per cent. rode on transfers, as against 21 per cent. in 1906. Unfavorable weather, which affected the heavy travel to seashore resorts, also tended to keep down earnings. The surface lines were most affected by both these causes and the result was a decrease of $208,041 or 2 per cent. in gross earnings from these lines. On the other hand, the elevated roads show an increase of $1,065,302 or 18 per cent., as against an increase last year of 14 per cent.

Much of the improvement work carried out during the last three years has been designed to relieve the surface lines in the congested districts by transferring through passengers to and from the elevated roads at outlying junctions. In spite of this the congestion of the surface lines on the Brooklyn Bridge and on Fulton street is now so great that little further increase in traffic can be expected until measures are taken to relieve it. The widening of Livingston street, so long delayed, will do much to help the situation between City Hall and Flatbush avenue, but there is no immediate remedy for the conditions existing at both ends of the Brooklyn Bridge. The opening of the Battery tunnel and the completion of the New York terminal of the Williamsburg Bridge are still some time away, and the complete reconstruction of the Brooklyn Bridge terminals, which has just been begun, is even farther off. It is expected, however, that temporary arrangements will soon be made to run through elevated trains over the bridge during the rush hours, and thus add materially to the carrying capacity of the terminal tracks.

Operating expenses rose from $10,441,377 to $11,465,705, an increase of 10 per cent., although the total car mileage rose only 7 per cent. The principal items which show a large increase in cost are operation of cars, 11.1 per cent.; maintenance of equipment, 9 per cent., and damages, 16 per cent. Notwithstanding unfavorable

weather and the increase in car mileage, cost of operation of power plants increased only 3 per cent., which is a gratifying showing in favor of the new and modern equipment which has been installed during the last three years. The big increase in the item of damages and legal expenses was due largely to the fact that during the year the settlement of pending actions was greatly expedited by the election of a number of additional judges, which increased the capacity of the trial courts about 40 per cent. President Winter has been markedly successful in reducing the number and amount of judgments for personal damages secured against the company during the last five years, and while the actual amounts paid last year increased 16 per cent. the number of cases settled increased 36 per cent.

The total track mileage operated increased from 557 miles in 1906 to 579 miles in 1907. Most of the additional track consists of new sidings and turnouts. The reconstruction of the Brighton Beach line into a four-track road is nearing completion and two tracks are now in use on the permanent location. The entire improvement is to be finished by January 1, 1908. This is the only important construction work being carried on at present, although contracts have been let for the elevated structure to connect the Broadway line with the Williamsburg Bridge elevated tracks. The construction account against which the 4 per cent. refunding bonds of the Brooklyn Rapid Transit Company are issued was much smaller than in 1906. There was $5,703,186 spent, as against $8,414,136 in 1906, a decrease of 32 per cent. Only $762,787 was spent for new cars and electrical equipment, as against $3,460,834 in 1906.

At the beginning of the year there were in the treasury $943,000 refunding 4 per cent. bonds and there were issued by the trustee on account of construction expenditures during the year and for the purchase or exchange of securities, $6,867,000 in bonds, a total of $7,810,000. Of these there were sold only $3,186,000 owing to the poor market, leaving on hand $4,624,000. There was $4,844,934 more expended to June 30, 1907, for which bonds may be issued. The bonds sold during the year brought an average price of only 88.35; the discount, amounting to $371,825, was deducted from the surplus.

The following is a summary of operations for 1906 and 1907:

	1907.	1906.
Miles operated	579	557
Gross earnings	$19,381,587	$18,473,328
Operating expenses	$11,465,705	$10,441,377
Net earnings	$7,915,882	$8,031,951
Passengers carried	511,839,437	452,604,203
Car mileage	68,273,181	63,657,323

NEW PUBLICATIONS.

The Art of Railroading, or the Technique of Modern Transportation. Calvin F. Swingle, Editor-in-Chief. Chicago, Ill.: Railway Publications Society. 7 Vols., 3,230 pages; profusely illustrated. Half leather. $30.00.

Two volumes of the seven are devoted to locomotive engineering; the third is on air-brake practice; the fourth on mechanical examinations; the fifth on locomotive breakdowns; the sixth on machine shop practice, and the seventh on station and train service. When the great mass of technical literature bearing upon these subjects is considered it is of course apparent that it has not all been so condensed as to have been brought within the limits of the work under consideration. Still, the series contains much that will be of value to the man who has not had the advantages of a school training and who has nevertheless an ambition to succeed. He will be taught a great number of facts and a few principles, and it is in the paucity of these matters that the books, like most of their class, are weak. Two examples of work well done and skimmed over follow one another in the first chapter on the duties of the fireman. Where sensible and latent heat are defined the work is so well done and so clearly explained that anyone who can read should be able to understand. But there is nothing to show why a sight feed lubricator delivers oil to the cylinder, and the explanation of the "principle" of the action of the pop valve is confined to a statement of what it does, though the reason can be dug out of the text in another place. So throughout the whole there is plenty of information regarding facts, and plenty of instruction as to what should be done when something definite occurs. In the locomotive section there are full descriptions of the mechanisms of the valves and other working parts, especial attention being paid to the Walschaerts gear, with details of the various extras, as they are called, that enter into the construction of the modern locomotive. By these are meant such parts as gages, safety valves, whistles and the like.

In the volume of mechanical examinations there is a set of tables on the link motion that can be made of great value to anyone who will study them carefully. There are comparatively few who realize the great delicacy of adjustment required in order to secure a proper action of the Stephenson link motion and of the effects of apparently slight changes in the dimensions and location of the parts. These tables show the "effects produced in the distribution of the steam with different laps, leads, travel of valves and points of suspension or locating the stud on the saddle." These are the main points in the variations that are rung in with the link motion but are by no means all. The volume also contains chapters on fuel oil, fuel combustion and modern air-brake practice.

In locomotive breakdowns there is sometimes something more than breakdown information proper. The volume is in the form of a catechism, and most of the questions and answers have a practical value, while others have the appearance of padding. For example, the reply to a question asking how a heavy main rod is to be handled when disconnected is to the effect that someone should be asked to lend a hand. Most of the questions, however, appear to be those that have been genuinely asked and credit for them and for their answers is given to the Brotherhood of Locomotive Firemen's Magazine.

In machine shop practice there is a collection of miscellaneous information starting in at the simple definitions of a primary arithmetic and leading up to logarithms; in a few pages, it passes through "practical geometry" to mensuration, and on to applied mechanics, and then with a brief sketch of the indicator and the methods of calculating horse-power we come to the general description of hand and machine tools with illustrations reproduced from catalogues of manufacturers, and conclude with a chapter on shop kinks. There is very little of this that is original though all of it may be of some value for reference, though of little to show the machinist how work should be done other than that conveyed in the general description of the machines.

The last volume on station and train work is a compilation of a number of papers and addresses that have been delivered by different persons upon the general subject of train handling and which are authoritative in that they emanate from men in positions of responsibility in train work. These are followed by the standard code of train rules, the rules for car loading, with instruction for general station work, concluding with a treatise on telegraphy.

As a whole the work is valuable as setting forth in a general way the salient features connected with certain branches of railroad work, notably that of the locomotive, and without going into these matters with a thoroughness that would make for a perfect understanding of the subject. Cars are not considered at all. The value of such text books is that they may serve as a guide to more extended study and they also serve conveniently for reference for those who wish some specific piece of information and do not care for an extended treatise. The use of the series for such references will be comparatively easy; for, while it is not cross-indexed, it is so arranged that it will be possible to find what is wanted with comparatively little trouble, provided it is there at all.

CONTRIBUTIONS

Parcel Rooms.

New York, Oct. 3, 1907.

To the Editor of the Railroad Gazette:

Increasing conveniences in railroad service and travel are recognized means of decreasing public hostility. If a standard could be established by the leading lines in the petty matter of collection of fees for holding parcels in the station parcel rooms something would be gained. The lack of uniformity is particularly annoying in New England. It is preferable to collect when a parcel is left as one is not apt to be in a rush.

Again, all newsstands and news companies should be compelled to keep postal cards and possibly stamps, plain paper and envelopes. How often we start on journey, forget a word home or to the office, try to get a postal at the first important stop and receive that chilly response, "We don't keep 'em." GEO. B. LEIGHTON.

Steam and Electric Locomotives.

At the September meeting of the New York Railroad Club a paper was presented on steam vs. electric locomotives that dealt, for the most part, with possible improvements in the steam locomotive, with especial reference to the introduction of the superheater. In discussing the paper C. A. Seley, M.E., of the Chicago, Rock Island & Pacific, said:

All the steam railroads are not to be electrified, at least in our day and generation; neither will a tithe of the magnificent sum of $188,000,000 be spent for superheaters, etc., for the improvement of the 47,000 locomotives now so industriously burning up the company's money. We are altogether too far up in the air in this talk of millions and billions, and the assumptions in this paper are based on united and concerted action and practice which can never obtain until the millennium.

No railroad man believes that blessed epoch to be at hand, although if the views of some of our electrical friends can be believed it is already here. The fact of the two magnificent experiments being made by the railroads in this vicinity in electrification on diverse, and in some ways directly opposed theories and methods, proves my case. It is altogether possible that both are right in their theories and methods, based on their conditions.

The lay mind knows or appreciates nothing of this; hence the

popular cry for electrification, the dear public apparently believing that with the elimination of the smokestack and the other unpleasant concomitants of the steam locomotive and the substitution therefor of the man with the controller handle, all travel and transportation will be made sane and safe, clean, swift, cheap, and in every possible and in some impossible ways, an improvement on present steam railway methods.

The honorable Mayor of my home city came here to New York to investigate steam railroad electrification in order to obtain information that would lead to an amelioration of the horrible conditions brought about by presence within the city limits of Chicago of soft coal-burning locomotives, and there is already a hysterical feeling, bred largely by uninformed newspaper opinion and influence, that Chicago railroads must follow the example of those of New York and electrify.

Does the honorable Mayor, aforesaid, know that the authors of the electrical paper referred to, after closely analyzing and showing by comparison the savings possible by electric operation, go on to state that "the immediate and general adoption of the new motive power by our railroad companies is neither possible nor desirable," explaining that the very magnitude of such operations, coupled with the fact of the youthfulness of the art and the necessity for careful and close analysis of the conditions surrounding each railroad property requires conservative and carefully considered action?

When the chaos now existing north of the Grand Central Station shall have been cleared away, the structures and track equipment are completed, trains running normally, and under electrical power only, and when all the bills are paid, then and then only will we be able to profit by the experience gained in these two applications, so varied, so interesting and productive of discussion and opinion. The New York work of railroad electrification was of necessity, as was also that in Baltimore, and largely on account of tunnels and the traversing of long distances of densely populated sections as well as the movement of a multitude of trains in that territory.

No doubt the evolution of the transportation problem in this city would, sooner or later, without legislative action require the increased movement possibly by the more frequent detached or multiple unit trains, displacing the older transportation methods, and for such movements through tunnels, the comfort of passengers aside from any other consideration is enhanced by electric power. Just how we will take up this matter on the railroads in Chicago remains to be seen, but as yet there is little direct and conclusive information to be gained from New York electrification.

By this time I have probably established myself in your minds as opposed to progress and improvement in transportation methods, but I desire to state that this is not the case. On the contrary I am a firm believer in electric traction wherever there is density of population from which induced travel can be built up by increased transportation facilities. When there is a continued density of population across considerable territory, then electrification is possible and advisable as a railroad main line proposition, otherwise the steam locomotive in the present state of the art.

I will also admit the desirability, although not always conceding the necessity, for electrification of railroads in large cities, particularly those which are terminals and which deal in suburban transportation. I am also a believer in the possibilities in improvement of the steam locomotive and to a certain extent on the lines indicated under discussion.

The performance of superheater engines on the C. P. R., on which the regular coal records and not special test reports shows definite and conclusive savings under weather conditions much worse than we have in the states, should be proof of the value of superheating of locomotives. We are progressing slowly on the Rock Island in superheating. Most of our difficulties have been with details and not with the general principle, and I have no fear but that we and others now taking up superheating will be enabled to improve engine performance.

Modern simple locomotives are, as a rule, carrying too high steam pressure, brought about to some extent by the use of such pressures on compound engines, and we have to realize that a mistake was made for which we are paying dearly in boiler maintenance with no compensating gain in economy.

Dr. W. F. M. Goss contributed a paper last year to the Western Railway Club, based on data, showing conclusively that "the evaporative efficiency of a locomotive boiler is but slightly affected by changes in pressure between the limits of 120 and 240 lbs.," and with an allowable increase of weight for a given boiler better results can be obtained by increasing its capacity than by increasing its strength for carrying higher pressure. With the use of pressures beyond 160 lbs. the difficulty in maintaining boilers, particularly in a bad water district, increases in a startling ratio.

If, then, we take advantage of this, designing boilers for pressures that will contribute to economical maintenance, utilizing also admitted benefit of superheating in further improving the quality of the steam; also eliminating the breakages ensuing on carrying water over into the cylinders, such engines will no doubt give records most favorable as to fuel economy and maintenance.

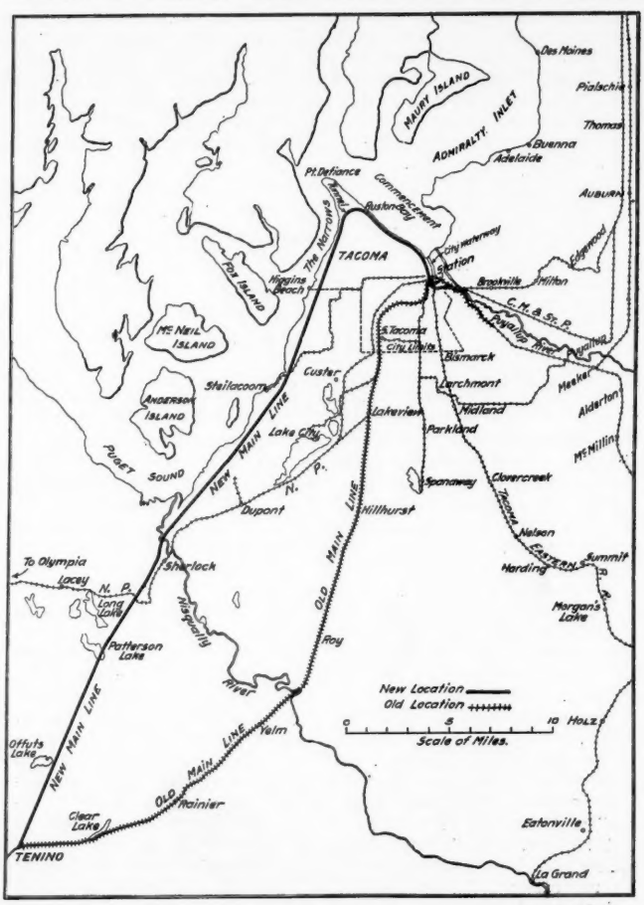
Feed water heating can be perfectly accomplished in stationary practice, but no successful heater has been developed for a locomotive. There may be one produced, but the chances are not in favor of it, as the water should come to a state of rest for precipitation, and this is not possible on a moving locomotive. Prevention is always better than cure, and the best place for feed water impurities is in the outlet of a water purification plant, and it will be found cheaper to take them out there than from the boiler. I have no doubt of getting larger economies in water treating than in heating for purification.

So far, I believe, there is no generally approved smoke consumer for locomotives except a good fireman. The stoker question is just now in a state of development, which is promising, but not yet conclusive. A pneumatic door-opener will decrease the labor of firemen very much and is worthy of attention until a successful stoker is adopted. I do not know if I have saved as many millions of dollars by my recommendations as has the distinguished writer of this paper (referring to Mr. Toltz's paper, not reprinted), but I do agree in the main with him and beg to congratulate him on his defense of the steam locomotive.

The New Tacoma-Tenino Line of the Northern Pacific.

BY H. COLE ESTEP.

At the time the Northern Pacific Railway was built there was nothing in the North Coast region to justify anything but the cheapest possible construction consistent with reasonable safety and economy of operation. But since that time conditions have changed mightily. The territory through which this and other northwestern railroads pass has become comparatively thickly settled and traffic has increased enormously. To meet this demand the roads have been practically rebuilt. The Northern Pacific has been engaged in rebuilding work for 12 years and nearly every mile of track has been changed. There are still, however, a few weak spots in the system, probably the most notorious of which is the Tacoma terminal and the main line from Tacoma to Tenino, 39 miles south. The company has been working on this problem for a number of years, but has just recently begun active operations on a radical relocation of this section of the line.

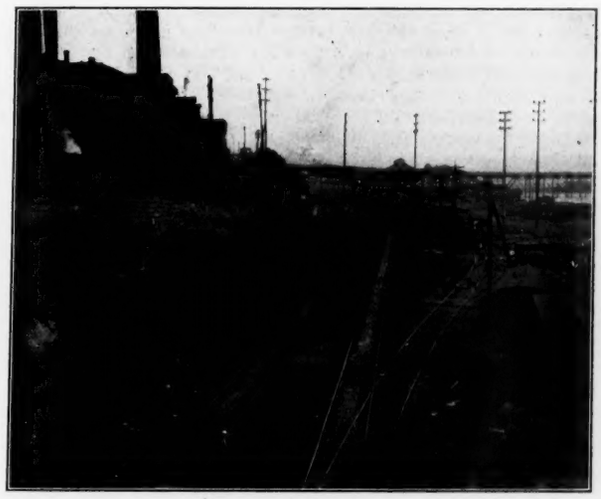


Part of Pierce County, Wash.; Showing New Tacoma-Tenino Line.

The problem of getting into Tacoma from the east is easy of solution, the Puyallup river valley forming a natural gateway and a water grade to Commencement bay. But the problem of getting out of Tacoma to the south is very difficult. The bluff rises either vertically or on a 1½ to 1 slope directly from the shore of the bay

to an elevation of about 100 ft. and then shades off gradually, reaching a level plateau at an elevation of 250 ft., five miles back from the shore. Leading down from this plateau are several steep, narrow ravines. These form the only direct approach to the city from the south.

Sixteen miles south of Tacoma the Nisqually river, a stream of considerable size, flows into Puget Sound from the southeast. Access to the plateau back of the city, and the territory south of it, can be gained fairly easily by using this valley. The natural and only logical route for a railroad from Tacoma to Portland is the one which follows the bay shore to the mouth of the Nisqually and then reaches the highland to the south through this gateway. But the construction of a line over this route encounters physical and financial difficulties which the original builders of the Northern Pacific preferred to avoid. They therefore accepted the only alternative and built the main line up the most favorable of the gulches noted above, and thus gained access to the prairie south of the city. This results in a tortuous 2.2 per cent. grade for four miles from Tacoma to South Tacoma, and in what is undoubtedly the most awkward and dangerous terminal arrangement on the coast. Likewise, the present location through the city of Tacoma includes many objectionable features.



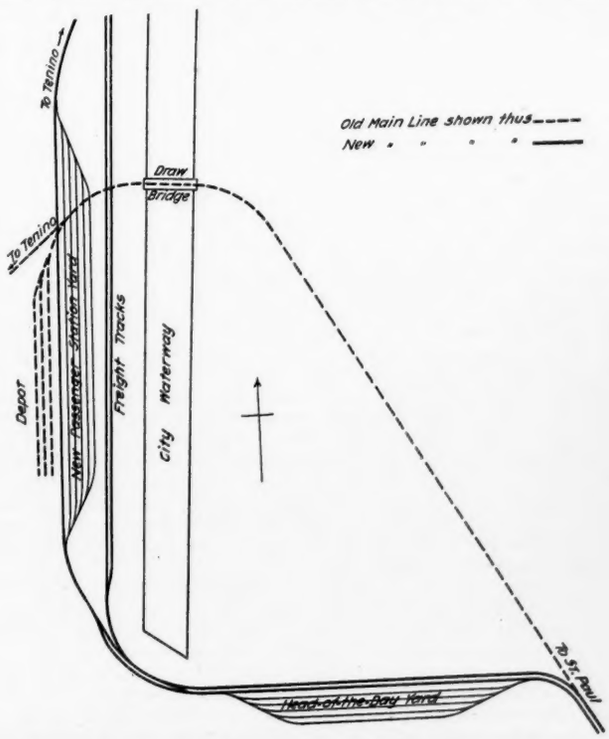
New Line West of Tacoma Passenger Station.
These tracks are now used for freight transfer.

The passenger station is approached from the east over a drawbridge which crosses a busy waterway and is open often, causing vexatious delays. Through trains, when ready to proceed, must *back* out onto the drawbridge and go up the heavy grade to South Tacoma. Trains approaching from the south must come down the same 2.2 per cent. grade, cross at grade the busiest streets of Tacoma, and enter the drawbridge which is just at the foot of the hill. Stopping on the bridge, the train is backed up the hill into the station. A more clumsy, dangerous arrangement could hardly be imagined.

Temporary Track Through Tacoma Mill Co.'s Property.

The new location will do away with all of this. Commencing at a point just east of the city the new line, called for the first five miles the Point Defiance line, leaves the main line and turns to the left, passing through the Head-of-the-Bay yards. The tracks then swing around the end of the waterway now crossed by the drawbridge, eliminating this objectionable feature, and proceed due west to Point Defiance. The new passenger station will be located on the site of the present one, but the tracks will be 15 ft. lower. The station will be double-ended and through trains will proceed without switching. Freight traffic will be diverted around the passenger station, using the two freight tracks already built along the bay shore.

The new line, on which construction work is now commencing,



Rearrangement of Tacoma Terminals; Northern Pacific.

Tacoma-Tenino Line near Coal Bunkers.
Illustration shows present temporary tracks.

is 40 miles long from Tacoma to Tenino. The general route is along the shore of Commencement bay for five miles to Point Defiance, thence southward along the east shore of Puget Sound to the mouth of the Nisqually river, thence up the Nisqually valley to Sherlock, crossing the Olympia branch at this point, thence southerly, skirting Patterson lake and Offut's lake, to Tenino, where it joins the present main line.

Aside from the rearrangement of the passenger station and the elimination of the drawbridge, already noted, the new work contains several points of engineering interest, including the line under the bluff near Sperry Mills, the Point Defiance tunnel, and the big fill and bridge crossing the Nisqually valley and river.

From the passenger station to the smelter, four miles west, the line is practically complete. This portion will be double-tracked. Two miles west of the station, near Sperry Mills, the line is flanked by the bay on one side and by a high bluff on the other. For a distance of 500 ft. back of the mill the bluff is practically vertical, and in order to keep it from sliding onto the track a concrete retaining wall, 300 ft. long by 30 ft. high, is being built. Passing through the plant of the Tacoma Mill Company, part of which will be removed to make way for the new line, the track skirts the bay to a point just east of the Tacoma smelter. Here, turning to the south on a 3-deg. curve, the line enters a 4,000-ft. tunnel under Point Defiance. The tunnel is driven through a sandstone formation and the west portal brings the line out to the east shore of The Narrows.

The next point of interest is the crossing of the Nisqually valley. The problem of locating a successful crossing at this point, which baffled the engineers of 30 years ago in laying out the original line, has been boldly solved by two tremendous fills. The river is approached from the north on a long fill varying from 20 to 40 ft. in height. The river itself, which is narrow, is crossed by the customary steel span, and on the south side occurs a duplication of the long, heavy fill forming the north approach. Over 1,000,000 yds. of earth and broken stone will go into these fills. The rest of the line to Tenino, which cuts off one end of Patterson lake, presents no unusual problems and is nothing more than a first-class road through a broken country.

The new line will cost, all told, $5,000,000. It will have 0.3 per cent. maximum grades and 3-deg. maximum curves, whereas the present main line has 2.2 per cent. grades and 8-deg. curves. The location is one of the best pieces of work in the West and was done under the engineering supervision of A. R. Cook, Division Engineer of the Northern Pacific.

Equipment Depreciation and Renewal.

BY WILLIAM MAHL,
Comptroller of the Union Pacific System and the Southern Pacific Company.

The provision in the Interstate Commerce Commission accounting rules effective July 1, 1907, in respect to the charges to be made thereafter to operating expenses under "renewals" and under "depreciation" of the several classes of equipment, has opened a wide field of inquiry and speculation as to the measure of this depreciation. The lack of information on this subject is the cause of considerable perplexity to the railroads; for this reason, percentages for depreciation were adopted and charges growing out of the misunderstanding of the intent of the provision in respect of "renewals" were made, which increased considerably the operating expenses of the railroads for the month of July. The hope is expressed that during the year ending June 30, 1908, sufficient facts on this subject will have been collected to enable the Commission to decide on the percentage of depreciation to be observed by the railroads for the next year for each class of equipment.

In the hope of giving some aid to all concerned in this inquiry, several statements accompany this article bearing on equipment renewals and replacements. These are compiled from data published in the annual reports of the Southern Pacific Company but summarized so as to present the facts in a concrete form. These statements also illustrate a simple method by which the Commission, the investing public, and others interested in the matter may form an accurate estimate of the extent to which the railroads have taken up annually in their operating expenses the cost of equipment worn out, condemned, sold or otherwise disposed of. Any further charge is not within the facts as depreciation applies to the operation of railroads, and it is doubtful if any liabilities thus created would stand in law or would be considered as such in a sale in which the seller contracts to turn over the property free of all debts except outstanding stock and the mortgage debt, or would be recognized as such by the courts in the event of a receivership.

The annual reports of the Union Pacific and of the Southern Pacific state fully the equipment destroyed, condemned or sold and the equipment added during the year, and also the amounts charged respectively to operating expenses, to replacement funds, or to capital accounts. In this illustration of equipment depreciation and renewals, the Southern Pacific has been selected because the even tenor of its operations was not interrupted by a receivership, into which so many railroads were forced during the business depression which followed the panic of 1893, and the accountability for its equipment has not been changed from the policy originally adopted. The value of the statements submitted rest on this policy for, by it, the depreciation was made good in the fullest sense of the term. At some time the precise amount of depreciation must be accurately ascertained, if the data in respect thereof is to be of any value or guide.

In the operation of a railroad, the depreciation is equivalent to the replacement of that which has been worn out, or which was condemned or sold because its further use was unprofitable. The constituent companies of the Southern Pacific Company dealt with their equipment as they did with any other renewals and replacements, that is, they charged to the operating expenses the current cost of a new locomotive or a new car purchased to replace one destroyed, condemned or sold. Nearly all the railroads of the constituent companies had been in operation for a number of years before the Southern Pacific Company was organized. It is safe, therefore, to assume that a considerable depreciation in equipment had already taken place by 1885 and that the time was near at hand when the annual renewals would not be far from the average annual depreciation. The data for the five years from March, 1885, to December 31, 1889, is lacking, but, in the year 1890, Mr. Collis P. Huntington was elected President of the Southern Pacific Company and a definite policy was thereafter observed in respect to equipment renewals. In the closing section of his report for that year the following reference is made to the equipment:

> "There have been destroyed since the year 1885, when this Company commenced to operate these properties, a considerable number of cars belonging to the various companies, the greater part of which were then quite old and of light capacity. Of this number only a part has been replaced, but arrangements will be made to replace the remainder, about 1,150 cars, during the year 1891. Their cost, estimated to be $569,926.65, and representing cars of standard capacity, has been charged up, and this sum is included in the 'Renewal Fund,' shown under the Company's liabilities."

Beginning with 1890 the companies charged to operating expenses the cost of new locomotives and passenger train cars, less salvage, if such cost did not exceed by any considerable sum the cost of the equipment replaced. When the standard capacity of freight cars was 25 tons, and, later on, when this was increased to 30 tons, the companies charged to operating expenses the cost of a new 25-ton or a 30-ton capacity car, less salvage for the old car, for every freight car destroyed, condemned or otherwise disposed of. Exceptions were made in one or two instances in which a large number of old 10, 12 and 15-ton cars of the Oregon & California and of the Central Pacific were condemned; in these instances new cars were added equaling in the aggregate the tonnage capacity of the cars vacated. The companies continued in this course until 1898, when cars of 40 and 50-ton capacity came into use and the price of cars advanced. Prior to 1898 the companies paid $425 to $435 for a standard 30-ton capacity box car complete (the railroads furnishing the air-brake and fixtures), and it was believed to be to the best interest of the companies to make replacement along these lines rather than to take advantage of any technicalities in accounting and to charge a part of such cost to betterments. The use of freight cars of 40 and 50-ton capacity and the much greater cost of steel framing and bodies, the use of passenger train equipment of more costly design, and of locomotives of much greater capacity, made it necessary to modify the former practice in regard to these charges. Since 1898 the increase in wages and in material had also added largely to the former cost of equipment of the same design. The companies, however, have continued to make renewals of equipment along the same lines on which they made all other renewals, that is, at the current cost and have charged to their operating expenses the current cost of replacing the particular type of locomotive or design and character of car destroyed, condemned, sold or otherwise disposed of, less the cash received for it if destroyed on foreign lines or sold, or the value of the old material if destroyed on the home line or dismantled.

The amounts which were thus charged to operating expenses, together with the cash received from sales of, or value of, the old material, were credited to a "replacement fund," which was used to pay for new equipment of the capacity and design then best adapted to the traffic of the railroads. *By these methods two important conditions in railroad management were faithfully observed; first, the integrity of the capital account was maintained, and, secondly, the actual depreciation (i.e. the current cost of the equipment worn out, condemned, sold or otherwise disposed of), was taken up in the operating expenses and made good from the year's income.*

Considerable data relating to equipment matters prior to 1902 was destroyed in the warehouse burned on Pier No. 34, North river, in May, 1907. The data for the six years now submitted, however, will be of greater value in this inquiry than that of the preceding years, because the subject is dealt with during years of great prosperity when the companies condemned and sold equipment liberally, and also because the charges to operating expenses is for equipment at the present high cost and not at the lower cost prior to 1898. In the following tables the cost per annum is based on the average

number of locomotives and cars in service computed monthly. In "repairs" are included the expenditures for repairs and renewals other than replacement for equipment vacated. In "vacated" is included the cost of the equipment destroyed, condemned and dismantled, sold or changed to another class:

No. 1.—Locomotives; Southern Pacific Company.

Year.	Average serviceable	Expenditures and charges for		Per locomotive per annum,	
	No.	Repairs.	Vacated.	Repairs.	Vacated.
1907	1,691	$5,717,667	$271,826	$3,381.23	$160.75
1906	1,655	5,042,967	767,407	3,047.11	463.69
1905	1,637	5,179,486	143,377	3,164.01	87.59
1904	1,516	5,370,649	70,334	3,542.65	46.39
1903	1,419	4,412,410	197,382	3,109.52	139.10
1902	1,323	3,528,199	237,848	2,666.82	179.78
Average for 6 years..	1,540	$4,875,230	$281,362	$3,165.39	$182.70

The large charge for locomotives vacated in 1906 resulted from the fact that a considerable number of locomotives in good condition, but too light for profitable service, were withdrawn. A number of them were sold to saw mills, and to logging and other railroads.

No. 2.—Passenger Train Cars; Southern Pacific Company.

Year.	Average serviceable	Expenditures and charges for		Per car per annum,	
	No.	Repairs.	Vacated.	Repairs.	Vacated.
1907	1,700	$1,361,829	$120,889	$801.08	$71.11
1906	1,624	1,194,668	146,950	735.63	90.48
1905	1,566	1,221,568	102,301	780.05	65.53
1904	1,483	1,094,459	128,248	738.00	86.48
1903	1,349	1,013,262	315,930	751.12	234.19
1902	1,300	963,747	124,680	741.34	95.90
Average for 6 years.	1,504	$1,141,589	$156,500	$759.20	$104.08

The large charge for cars vacated in 1903 resulted from a charge of $225,000 for cars destroyed by fire on the Alameda Mole.

No. 3.—Freight Train Cars; Southern Pacific Company.

Year.	Average serviceable	Expenditures and charges for		Per car per annum,	
	No.	Repairs.	Vacated.	Repairs.	Vacated.
1907	43,662	$3,875,956	$1,058,274	$88.77	$24.24
1906	44,172	3,173,773	1,269,492	71.85	28.74
1905	44,887	2,893,135	562,053	64.45	12.52
1904	44,571	3,031,840	524,882	68.02	11.78
1903	41,982	2,779,309	512,697	66.20	12.21
1902	38,625	2,380,410	465,372	61.63	12.04
Average for 6 years..	42,983	$3,022,404	$732,128	$70.31	$17.03

The large charge for cars vacated in 1906 resulted from the withdrawal of 3,389 cars which, although in good condition, were too light for profitable service. In repairs, are included payments for foreign cars wrecked and the cost of repairing foreign cars while on the company's lines. From records kept for 12 years, the repairs of such cars averaged 7.58 per cent. of the combined repairs of owned and foreign cars.

The per cent. of freight-train cars vacated to the total number of freight-train cars in service at the beginning of each year for the past 17 years was as follows:

Year.	Per cent.	Year.	Per cent.	Year.	Per cent.	Year.	Per cent.
1891.....	3.44	1896.....	2.87	1901.....	3.13	1906.....	6.83
1892.....	3.75	1897.....	2.28	1902.....	3.53	1907.....	4.39
1893.....	3.00	1898.....	3.54	1903.....	3.15		
1894.....	2.57	1899.....	4.41	1904.....	3.01		
1895.....	3.41	1900.....	3.02	1905.....	3.48		

Including the large number of cars vacated in the year 1906, the average for the 17 years is 3.63 per cent.

It should be borne in mind that this average of 3.63 per cent. is for cars of wooden construction, of which the cost of a box car probably did not exceed $450, excluding air-brakes. These wooden cars are now replaced by cars largely of metal construction, on which the depreciation will be slight, as, with the exception of cars destroyed or sold because they become unprofitable to use, the damaged or worn-out parts are constantly renewed and the depreciation thus made good. The position of these steel cars is similar to that of locomotives, which are vacated principally because of obsolescence and not of depreciation.

The following statement shows the number of locomotives and cars vacated in each of the six years, the amount credited to the replacement fund, the amount charged to operating expenses, and the amount of salvage:

Year.	Locomotives.	Cars		
		Passenger train.	Freight train.	Road service.
1907	34	63	2,949	148
1906	127	47	3,389	103
1905	29	28	1,556	78
1904	17	32	1,367	56
1903	34	78	1,270	33
1902	53	51	1,266	50
Total number vacated.....	294	299	11,797	468
Total amount credited to replacement fund	$2,733,680	$1,264,139	$6,518,467	$265,504
Total amount charged to operating expenses	1,688,174	938,998	4,392,771	177,717
Scrap value or price realized for equipment sold	1,045,506	325,141	2,125,696	87,787
Av. price per locomotive or per car:				
Credited to replacement fund...	9,298	4,228	533	567
Charged to operating expenses...	5,742	3,140	372	380
Av. proceeds from sale or salvage...	3,556	1,087	180	188

Total credited to replacement fund	$10,781,790
Total charged to operating expenses	7,197,659
Total scrap value or salvage	3,584,131

The sale to saw mills, to logging and other railroads of a considerable number of the locomotives vacated in 1906, added considerably to the salvage value.

Making allowance for the exceptions in the years 1903 and 1906, it will be observed that there has been a fairly approximate average annual charge for equipment vacated per locomotive or per car in service. This charge fixes a unit by which an estimate may be formed by all interested in this question of the extent to which a railroad company is making good the depreciation of its equipment.

There will be as much difference among the railroads in this charge for depreciation as there is now in the average cost per annum for maintenance of way and structures per mile of road, or for the average cost of repairs per locomotive or per car per annum; in fact, in any cost of operation, and rightly so, because the conditions are not alike on any two properties.

The lines of the Southern Pacific Company traverse such an extended area that its equipment is subjected to every climatic condition which affects its service or its life. Therefore, the results here submitted represent about an average of all conditions under which equipment is used or maintained.

From its organization the Southern Pacific Company purchased all equipment for the constituent companies. It did this because it could obtain it on more favorable terms and because a better observance of the adopted standards was secured thereby than if each company dealt separately for itself. The accountability for the equipment vacated, the allotment to the replacement fund or capital account of the respective companies, and the lease, sale or other disposition of equipment owned or purchased was entrusted by Mr. Collis P. Huntington to the writer. In 1886 Mr. Huntington also delegated to him the authority to approve all common standards for equipment for the lines controlled by him east of the Mississippi river, and, in 1894, for the lines of the Southern Pacific Company. In the lines east of the Mississippi river were six constituent companies, each operated by its own officers; the lines west of the Mississippi river comprised originally 26 distinct companies, thus making a total of 32 companies for which all transactions in respect to equipment came under the supervision of the writer up to the time of Mr. Huntington's death in August, 1900. The administration of this trust brought with it a great deal of personal work, and an experience with difficulties and complications which were not apparent until they were met. Much time and labor are required to secure accuracy in accounting for equipment even in so simple a form as that in which the results are reported under the heading of "Equipment" in the annual reports of the Union Pacific Railroad and of the Southern Pacific Company.

Appreciating, therefore, all the difficulties and cost which the keeping of the equipment accounts as contemplated by the Commission will impose upon the railroads without any practical compensation therefor, the writer expresses the hope that the Commission will amend its rules by omitting altogether the provision for "depreciation," and amend the provisions for "renewal" to represent the current cost of replacing all equipment vacated. This change will furnish the Commission with reliable data about the depreciation which has been carried into the operating expenses of the railroads and enable it to order adjustments suitable to each case if any such should be necessary.

Economy Test of 7,500-K.W. Westinghouse Parsons Steam Turbine

On September 1, 1907, an eight-hour economy test was made on turbine No. 253, installed earlier in the year, at Waterside station No. 2, of the New York Edison Co. The test was conducted by the New York Edison Company, under the direction of J. P. Sparrow, Chief Engineer, and the arrangements were carried out in accordance with a mutual agreement between builder and operator, entered into previous to the test. The results, as here given, were obtained by independent computation.

The turbine unit tested is of standard Westinghouse construction throughout. It has a maximum rated capacity of 11,250 kw., and was built to operate on 175 lbs. steam pressure, 28 in. vacuum and 100 deg. superheat. Under these conditions, the turbine unit was guaranteed to have a minimum steam consumption of 15.9 lbs. per kw. hr. at the generator terminals with a normal speed of 750 r.p.m. The electrical efficiency of the generator was guaranteed to be 97.8 per cent., exclusive of friction and windage, at a load corresponding to that sustained during the test. The results of the test detailed below show an economy about 7.5 per cent. better than the guarantee.

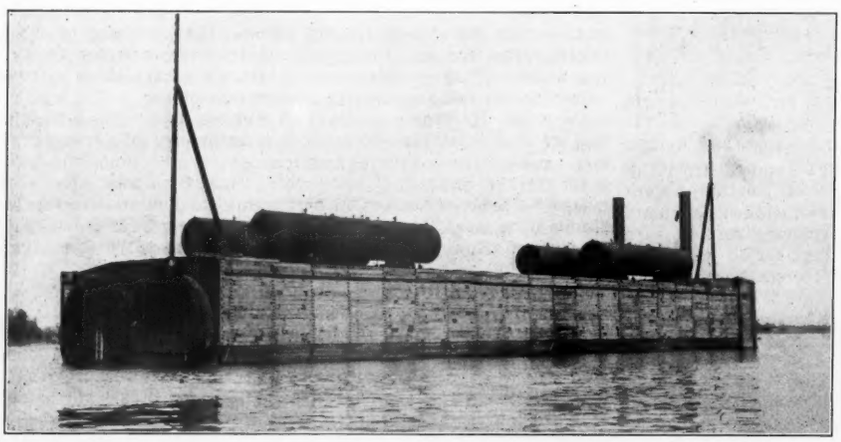
During the test period, No. 2 Waterside station sustained practically all of the 25-cycle load on the system, of which the unit under test carried practically 70 per cent., the remainder being carried by the other turbine units in the station. This load was maintained as constant as possible by remote control of the turbine governor by the switchboard operator. Between the first and the last hours of the test, the maximum variation in load was held within 4 per cent. above and below mean. During the last hour, however, the load decreased somewhat. Previous to the test, this

turbine unit had been running on a load of 7,000 kw., which was increased to its test load 10 minutes before the start.

Three-phase electrical load was measured by the two-wattmeter method, using two Weston indicating wattmeters of the standard laboratory type. These instruments were calibrated at the New York Electrical Testing Laboratories immediately before and after the test. Power factor was maintained substantially at unity, and all electrical readings were taken at one-minute intervals.

As a surface condenser was used in connection with this turbine unit, the water rate was determined by weighing the condensed steam delivered from the condenser hot well. This condensation was weighed in a tank mounted on platform scales, with a reservoir above large enough to hold the condensation accumulating between each weighing. These weighings of 12,000 to 13,000 lbs. each were made at intervals of five minutes. By the loop method of connecting the gland water supply the necessity for correcting condensation by an amount equivalent to the weight of the gland water used was avoided. A continuous gland water circuit was used entirely outside of the weighing apparatus, and all overflow from the standpipe was returned to the hot well delivery.

As the circulating water was quite salt, any condenser leakage could immediately be detected by the salinity of the condensed steam which should be pure distilled water. On this account, condenser leakage was determined entirely by chemical analysis, employing the silver-nitrate test with a suitable color indicator. This method proved extremely sensitive and possessed a decided advantage over the ordinary method of weighing the leakage accumulating during a definite period when the condenser is idle and under full vacuum. As samples of circulating water and condensed steam could be taken at the same time, this method made it possible to discover any change in the rate of condenser leakage taking place during the test, while the method of weighing above described provides only an average result during the period.



Floating the First Section of the Detroit River Tunnel Tubes Into Place.

In this condensing plant the delivery of the hot well pump is automatically controlled by a float valve in the interior of the hot well. This maintains the water level therein at a practically constant point, and hence no correction had to be made for difference in level of water in the hot well before and after the test.

Steam pressures and temperatures were determined close to the turbine throttle. As usual, the degree of superheat was obtained by subtracting from the actual steam temperature the temperature of saturated steam at the corresponding pressure carried at the time. All gages and thermometers were calibrated previous to the test at the United States Testing Bureau. Both pressure and superheat were somewhat below the guarantee basis.

Vacuum was measured directly at the turbine exhaust by means of a mercury column with a barometer alongside for reducing to standard barometer—30 in. This also obviated the necessity for temperature correction between the two mercury columns. During the test the vacuum was not maintained quite up to normal.

The following data represents the results of the tests, calculated for the conditions as actually run; i.e., for instrumental errors only:

Duration of test	9:30 a. m. to 5:30 p. m.
Average steam pressure at throttle, lbs. per sq. in. gage	177.5
" superheat at throttle, degs. F.	95.74
" vacuum (referred to 30" Barom.) in Hg.	27.31
" load on generator, kilowatts	9,830.48
" steam consumption, as tested, lbs. per kw.-hr.	15.15

Owing to the departure, during the test, from specific operating conditions on which guarantees were based, it was necessary to correct the observed results by the following amounts: Pressure (2.5 lbs. high) correction, 0.25; vacuum (0.69 in. low) correction, 1.84 per cent.; superheat (4.26 deg. low) correction, .29 per cent. These corrections were mutually agreed upon previous to the test as representative of this type of turbine. When applied to the observed steam consumption given above, the following results, representing contract conditions, are obtained:

Average corrected water rate during 8-hr. test	14.85 lbs. per kw.-hr.
Guaranteed water rate	15.9 lbs. per kw.-hr.

The load was considerably lower during the first and last hour than during the main part of the test. Neglecting, therefore, these two hours and considering only the six hours period from 10.30 a.m. to 4.30 p.m., the results are as follows:

Average corrected water rate	14.8 lbs. per kw.-hr.
Equivalent water rate	10.65 lbs. b. h.-p.-hr.
Equivalent water rate	9.8 lbs. i. h.-p.-hr.

The two latter quantities are determined by applying conversion factors for generator efficiency and for internal losses.

In connection with these tests, a noteworthy agreement exists between the results noted and those previously obtained from tests of machines of similar design installed in the Manhattan station of the Interborough Rapid Transit Co., New York, and the Long Island City station of the Pennsylvania Railroad, at the same loads and with equivalent operating conditions, the performance of the machines is almost identical. These economic results, while not exceeding in actual steam consumption, the best records of European practice, are extremely good in view of the moderate operating conditions under which the test was conducted.

Progress on the Detroit River Tunnel.

The first section of the twin tubes and caisson of the Detroit river tunnel was successfully sunk in place on October 1, and the work of placing concrete by tremie in deep water is being carried on without difficulty. The accompanying illustration shows the first section, 260 ft. long, being towed down the river from the yard at St. Clair, Mich., where it was built and launched. There will be 10 sections like this, each 260 ft. long, and containing two tubes 23 ft. 4 in. in diameter. The tubes supported in the timber caissons will be sunk in a trench dredged in the bottom of the river and the caissons filled with concrete, completely surrounding the tubes.

After concreting of a section has been completed the water will be pumped out of the tubes, a moderate air pressure put on and the work of putting in a reinforced concrete lining 20 in. thick begun from the inside. The tubes are built of boiler plate strongly braced and have a temporary bulkhead on each end which will be removed when the work of lining is begun. For a full description of the Detroit river tunnel work the reader is referred to the *Railroad Gazette*, February 16 and 23, 1906. The tunnel will cost about $10,000,000 and is expected to be completed by June, 1909.

Foreign Railroad Notes.

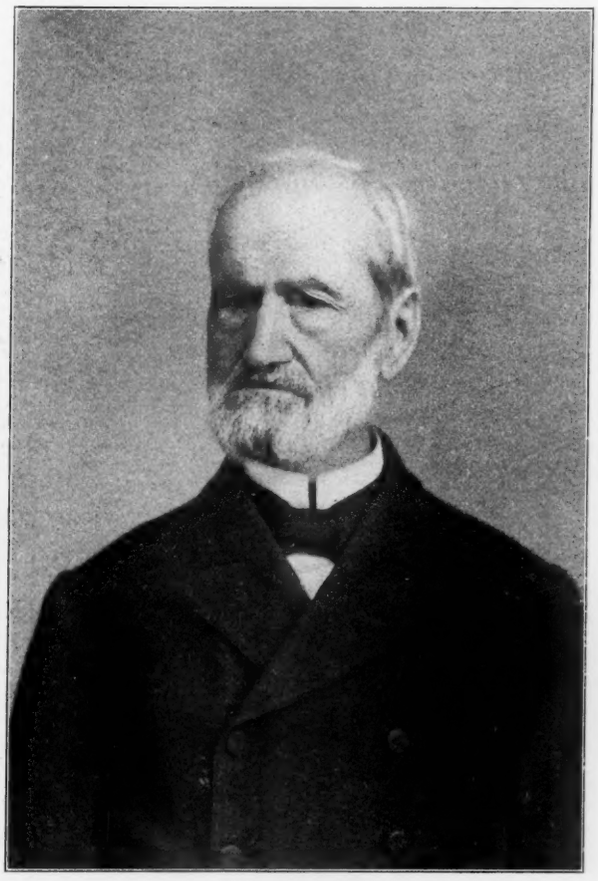
Express freight trains from Siberia to St. Petersburg and Baltic ports are to run the coming winter for carrying tea, fruit (?), eggs, fish, poultry, game and butter. The time from the River Obi to St. Petersburg will be 254 hours by way of Moscow and 224 hours by the route which passes north of Moscow.

The contract for the construction of a line from the Mer de Glace to the summit of the Jungfrau has been approved. This extension of the present line involves the excavation of a tunnel 2½ miles long under the Friar and the construction of about a mile and a half in the open with an elevator at the end rising to the center of the mountain. In spite of the apparent difficulties of the work, the engineers think that it can be finished in four years and a half of constant work. The capital required for this extension of the line will be $700,000.—*Le Journal des Transports.*

In South Africa railroad cars are used as movable missionary stations. Along the northern extension of the Cape Government Railways, clergymen of the Church of England for the past three years or more have been going up and down the line on locomotives and freight trains acting as missionary pioneers. The Cape government has now given to one of them a railroad car for missionary uses. There is also a similar car in use in the Transvaal and a third in Rhodesia. These cars are fitted up with a sitting room, kitchen and bedroom. They carry illustrated magazines, weekly papers and other literature which is welcomed in regions where good reading is scarce. They are parsonages or rectories on wheels.

Samuel Sloan.

Samuel Sloan, who died on September 22, was nearly 90 years old. He had been in bad health for about a year, although he presided as Chairman of the Board at the meeting of the directors of the Delaware, Lackawanna & Hudson last June. Mr. Sloan was born in Lisburn, Ireland, in 1817; his parents came to this country two years later. He was educated in New York and when he was 15 years old began work in an importing house. He became a partner in this firm, McBride & Co., in 1845, and was its head when he left it 10 years later. He became interested in New York city politics in 1852, and in 1857 was elected to the New York Senate. Two years before he was made a Director of the New York Central & Hudson River, and soon after was elected President of that company. He resigned in 1864 when Commodore Vanderbilt got control. He was then offered the presidency of the New York & Harlem, but declined. He was Arbitrator and Commissioner of Trunk Lines for two years and was then elected President of the Delaware, Lackawanna & Western. This road was then only a short line, getting a little way into the Pennsylvania coal fields. He resigned as President in 1899, being succeeded by W. H. Trusdale, and since that time acted as Chairman of the Board. He had been at various times president of many other roads, including the Michigan Central, the Rome, Watertown & Ogdensburg, and the International & Great Northern. At the time of his death he was a director or officer of 33 companies. He was married in 1843 and his wife and six children survive him.



Samuel Sloan.

A Modern Method of Locomotive Boiler Washing.

At a recent meeting of the Iowa Railway Club E. J. Harris presented a paper descriptive of the equipment used for washing out boilers in use at Valley Junction on the Chicago, Rock Island & Pacific. It is known as the Miller system for washing, changing water in and refilling locomotive boilers. This is comprised of two boilers or heaters, one 5 ft. in diameter and one 6 ft. 8 in. in diameter, both 16 ft. 6 in. long between flue sheets, the smaller placed over the larger and occupying one stall in the roundhouse. Each boiler is filled with flues and has a chamber at each end 2 ft. long, making them 20 ft. 6 in. long at joint of heads. Cold water under pressure from the boiler washing pump is admitted at the bottom of the larger heater, forced through from one heater to the other outside the flues and connection to the roundhouse boiler washing pipes made at top of the top heater. The exhaust steam of the stationary plant and waste water and steam from locomotives in need of boiler washing is used by means of suitable piping connected to the chambers at the ends of the heaters, to heat the cold water, with the result that there is always an abundance of hot water for boiler washing.

When the plant was first installed the steam pipe was connected to the heaters with a Y at one end between the heaters, the idea being that when blowing off the steam would rise to the top heater and hot water fall into the bottom one.

This did fairly good service, but we found when washing two boilers and filling two at the same time it was necessary to cut in a live steam pipe to the heaters to keep the water warm. This was too much of a drain on the stationary boilers, so a plan was developed to admit both steam and hot water to the lower heater. This made a marked improvement, which was still further bettered by the utilization of the waste steam and water of the roundhouse to heat all of the water. To do this partitions were inserted making three sections of the lower heater and two of the top. Waste steam and water was admitted to the central section of the lower heater, the waste steam flowing back through the upper section of flues in middle chamber, forward again through the top section of flues, up through the connecting pipe into lower section of upper heater, back through these flues and forward again in upper section of flues to the escape pipe to roof.

The hot water was made to flow back through the lower section of the flues in the middle chamber of the lower heater and forward again through the flues in the lower chamber to the overflow, thereby getting a perfect circulation through all of the flues of all of the heat obtainable. The results were very satisfactory. A Fahrenheit thermometer placed on the top boiler never registers less than 200 deg. while the usual registration runs from 208 to 212 deg. In fact, it is now necessary to blow off the locomotives into the heater in order to keep the roundhouse free from steam as the escape from the stationary boilers is sufficient to heat the water as evidenced by the continual escape of steam from the overflow pipe at the top of the heater.

With this arrangement the boilers are never allowed to cool except for boiler work, and there have been no cracked sheets since the system has been put into use. This, however, is perhaps one of the least of the benefits derived. The old method of preparing boilers for washing with the heavy power was as follows: Steam was blown off and sufficient cold water admitted to boiler through injector and check to fill boiler. The belly plug was then pulled and sufficient cold water allowed to flow into boiler to maintain a water level in the glass. This was kept up from an hour to one and one-half hours, by which time the boiler would be sufficiently cool to allow its being emptied of water, plugs pulled and washing started. A clear loss of from one to one and one-half hours, as by the new method the blow-off cock is connected to the heater and all of the steam and water blown off in the same time that was formerly used in blowing off the steam alone. The plugs are then pulled and it is found that all of the mud and slush being still hot is very easily washed out, particularly as we are using hot water to wash. Boiler is washed in two-thirds of the time, is washed more thoroughly, plugged and filled with hot water, and if engine is needed the caller is sent after the crew when the fire builder starts his fire in engine. Water being near 212 deg., or boiling point, the engine makes steam rapidly.

One of the heavy engines has been on the turntable under its own steam 25 minutes after the fire was started and where, under the old method, it averaged nine hours after an engine arrived at the clinker pit, to wash the boiler and get it outside ready for its train, the same work is now done in five hours, and with less injury to the boiler, as it never gets cold.

The time saved in doing the work is not the only economical factor. It has been found that under the old method it took about 7,000 gals. of water to cool the boiler, and this at 6 cents per 1,000 gals. cost 42 cents, which is now saved.

Tests were made to determine the saving of coal effected with the results as follows: Engine 1,642 with 3-in. cold water level in glass, water at a temperature of 42 deg. was fired up with 10 sticks of wood (cord), and in 1 hr. 50 min. the gage registered 50 lbs. steam, using 1,368 lbs. of coal.

Same engine with 3-in. hot water level in glass, water at a temperature of 170 deg., was fired up with 10 sticks of cord wood and in 55 minutes gage registered 50 lbs. steam, using 1,020 lbs. coal. Coal in both cases weighed and same man used in building fires.

About 1,600 engines are handled every month at this point, and it was found that the saving in fuel and water during the first 12 months nearly covered the cost of installation. It is also found that the saving in fuel and water amounts to 64 cents per engine as compared with the use of cold water, and that the average saving in these items since the plant was installed has amounted to $515.85 per month.

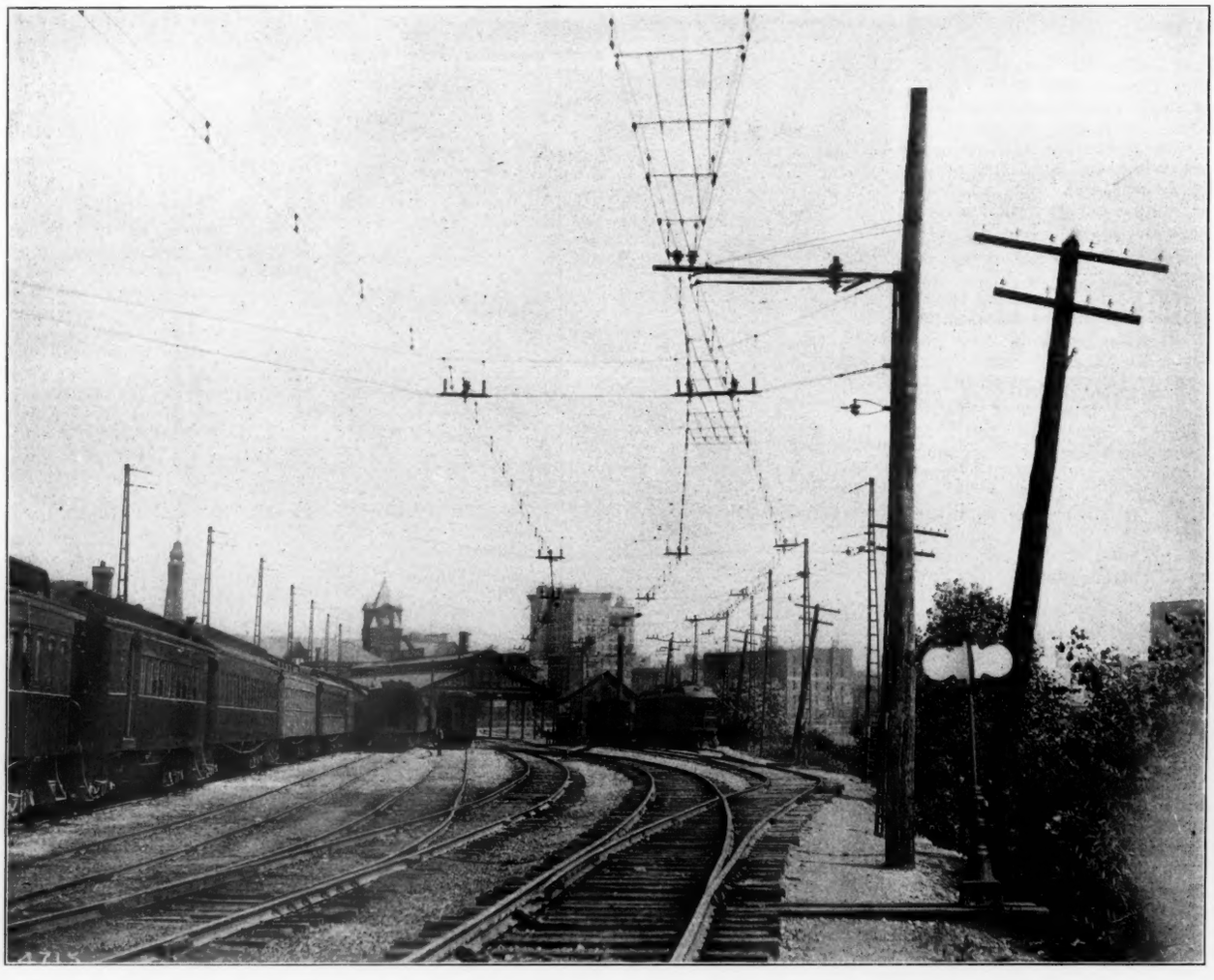
The new Executive Council of the Italian State Railroads, recently appointed, includes three engineers and two lawyers who belong to the government service, and two engineers and a great landed proprietor outside of the service.

Electrification of the Rochester Division of the Erie Railroad.

BY W. N. SMITH,
Electric Traction Engineer, Westinghouse, Church, Kerr & Co.

The change from steam to electric motive power on a portion of the Rochester division of the Erie Railroad, which took place on the 18th of June, 1907, is the first installation of a single-phase alternating system of electrical motive power on a steam railroad to go into commercial operation. This electrification can justly claim the priority of application of several important features, which are of interest in connection with the discussion on systems best suited for steam railroad electrification. This line was the first to operate electric cars on the single-phase system over the tracks of an operating steam railroad; the first in this country to use 11,000 volts working pressure commercially on a trolley, and the first instance of a heavy electric traction system receiving power from the 60,000-volt transmission line.

All of the construction described below, except that of the 60,000-volt power transmission line and the car bodies and trucks, was designed, executed and placed in operative condition by Westinghouse, Church, Kerr & Co., Engineers, through whose courtesy the drawings and photographs which illustrate this article were furnished.



Rochester Terminal Yard, Four Tracks Electrified, Showing Overhead Span Construction.

The section of track equipped is 34 miles long, extending from Rochester over the main line of the Rochester division to Avon, about 19 miles, thence 15 miles over the Mt. Morris branch. The railroad is single track, with sidings at way stations, averaging three to four miles apart. The grades are light, and the curvature for the most part easy, the line being relatively quite straight.

The line was originally laid with 68-lb. rails, but was relaid with 80-lb. rail, taken from another division just prior to the electrification. The roadbed is ballasted with gravel, and the joints are of the Weber type. A single No. 2/0 protected rail bond is applied to each rail joint under the plate, one of the advantages of the high tension single-phase system being that the relatively small current combined with the high impedance of the main circuit renders it unnecessary to resort to heavy bonding. The line crosses a number of bridges, the longest one, that over the Genesee river, about a mile and a half south of Rochester, being 780 ft. long, comprising seven spans. There are also through truss bridges at Rush, and at Caneserauga creek, near Mt. Morris, and a stone arch bridge over Conesus creek, a short distance south of Avon.

The electric service is devoted solely to passenger traffic, which is of the local interurban type. The freight service is handled exclusively by steam as heretofore, as are also the through trains operating between Rochester and Corning over the main line of the Rochester division, a distance of about 94 miles. The steam service between Rochester and Mt. Morris originally consisted of three trains each way daily. The principal villages served are Avon, Geneseo and Mt. Morris, the other regular way stations being little more than cross road stops. The population is entirely agricultural, and the Genesee valley traversed by this line is probably one of the most beautiful and prosperous farming regions of New York state. Instead of three round trips per day, the electric service has introduced six complete round trips between Rochester and Avon, and nine between Avon and Mt. Morris.

POWER SUPPLY.

The power is generated at Niagara Falls, at the plant of the Ontario Power Company, and is transmitted at 60,000 volts, three-phase, over the lines of the Niagara, Lockport & Ontario Power Co. The Iroquois Construction Company built a branch connecting line from Mortimer, about four miles south of Rochester, to Avon, locating it on the Erie right-of-way for nearly the whole distance. The pole construction used on this branch transmission line is of the A-frame type, using two 40-ft. cypress poles, set abreast of each other, and inclined so that their tops are framed together, the butts being joined by horizontal plank braces underground. The conductors are of No. 4, hard drawn, stranded copper cable. The standard length of span between poles is 220 ft., which is shortened at curves where necessary. When crossing over the tracks of the Erie, or other railroads, a special construction of No. 0 copper cables carried on steel towers is used, so reinforced by guys that it is impossible

for a failure of the line to result in dropping the conductors across railroad tracks.

SUBSTATION BUILDING.

The substation building is located in the Y formed by the railroad tracks at Avon, and together with the car shed, is adjacent to the roundhouse and division repair shop. The walls of the building are of brick, resting on solid concrete foundations, the roof and floors being of reinforced concrete. The building is absolutely fireproof. Its dimensions are 39 ft. 8 in. x 44 ft. on the outside and 29 ft. 10 in. high from the top of the foundation to the top of the parapet.

In the basement of the building are located one of the transformer oil tanks and the oil pump. The main floor is divided into three rooms, the main transformer room being 43 ft. x 17 ft. and extending the full height of the structure to allow room for the high tension bus bars, which are carried over the transformers. The remaining space on the main floor is divided into a high tension room 16 ft. 8 in. by 19 ft. 8 in., and the operating room, 19 ft. 8 in. by 24 ft., where is located all the 11,000-volt switching apparatus and the measuring instruments.

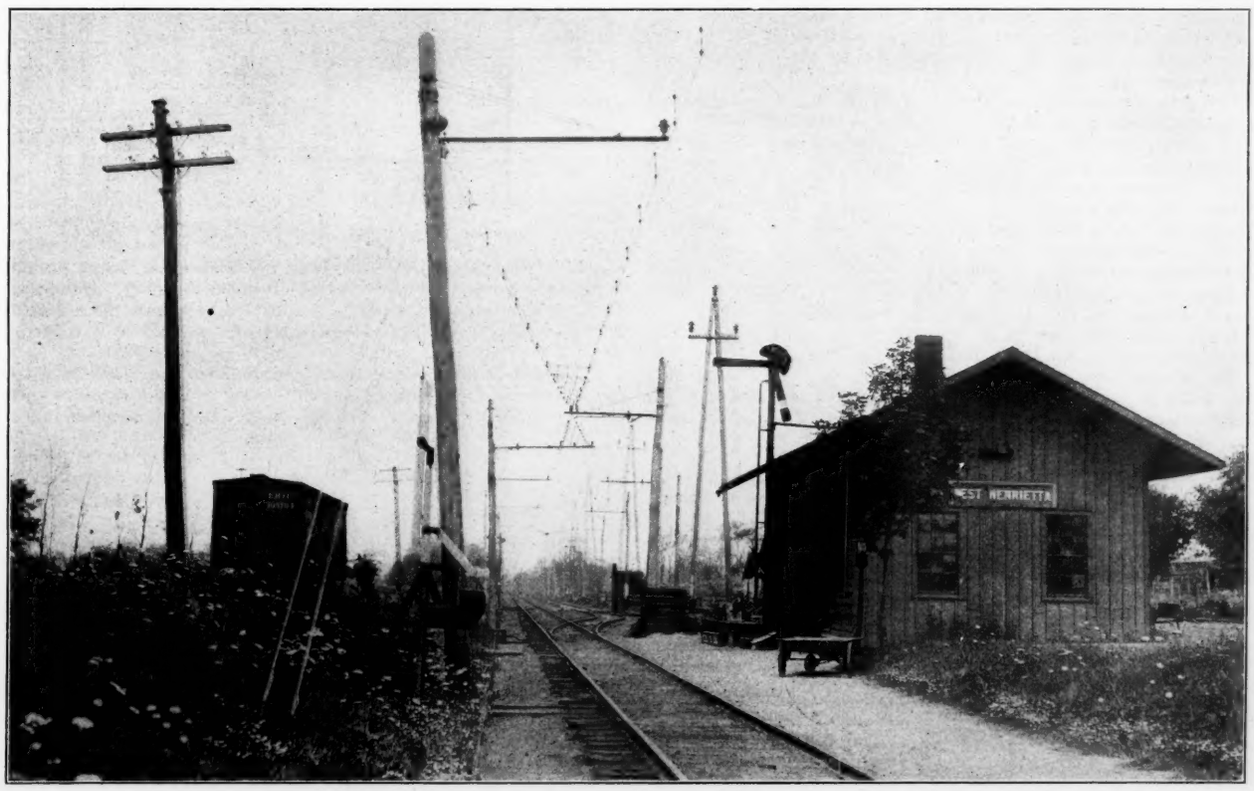
SUBSTATION EQUIPMENT.

The transmission line terminates at the lightning arrester yard in the rear of the substation. The three high tension conductors from the lightning arresters enter the substation through glass discs held in 36-in. tile, set in the upper portion of the rear wall of the substation. Within the substation, the wires first pass through three 60,000-volt stick type circuit breakers, mounted directly inside of the rear wall. Thence over bare copper conductors to the three oil insulated choke coils, situated on the mezzanine floor; thence to three oil insulated series transformers, also on the mezzanine floor, from which connections are taken to the power measuring instruments in the operating room. The main connections finally terminate upon a set of copper bus bars in the transformer room directly over the line of transformers.

The 60,000 three-phase current is rendered available for single-phase distribution by means of three transformers of the Westinghouse oil insulated water-cooled type, each of 750 k.w. capacity. For the present installation, two transformers only are used at one time, the third being a spare. The high tension connections are such that in case of one transformer failing while in service, its connections can quickly be taken off of the bus bars and put on the spare transformers. The transformer windings are fitted with taps enabling the three-phase to two-phase "Scott connection" to be used. The low-tension windings can be so connected that either 11,000 volts or 22,000 volts can be obtained, so that in case it should ever be desired to transmit railway current for an extension of 40 or 50 miles to another substation it could readily be done without adding transformers to this equipment. The low-tension windings also have six taps, enabling relatively small variations in the secondary voltage if the same should be necessary to suit operating conditions in the trolley line.

The transformer cases are made of boiler iron. Each rests on a square cast-iron base, which is in turn mounted on three pairs of wheels running on an iron sub-base set in the concrete floor of the room. A track runs lengthwise of the room directly in front of the transformers, a transfer truck running on it, on the top of which there is another set of wheels or rollers, which line up with those on which the transformer cases are set. When it is desired to remove the windings from the transformer case, it is only necessary to disconnect the electrical, water and oil connections, roll the transformer off its sub-base and on to the truck, which is then pushed to the rear end of the transformer room, where it comes directly under a 10-ton hand hoist.

Two cylindrical iron oil tanks are provided, each of slightly greater capacity than a single transformer. One is located in the basement directly under the transformer room, so that the oil from any transformer can readily be drained into it. The other is suspended from the concrete roof beams at the top of the transformer room, close to the side wall of the building, this being intended to act as a reservoir for distributing oil back into the transformer. The oil is pumped from the lower to the upper tank by means of a steam pump supplied from the boiler room in the adjacent division roundhouse, where steam is always available. From the upper tank oil is fed by gravity into either transformer. It is thus a simple matter to draw the oil off from any transformer if its insulating qualities are found to have depreciated, and the dehydrating, filtering or purifying apparatus can readily be employed with the aid of the pump, and the supply returned again to storage. The oil piping is of iron throughout.



Overland Bracket Construction for Main Line and Siding at West Henrietta.

The water circulation is by gravity, the supply coming from the railroad company's water tank system at the adjacent roundhouse, being pumped originally from the Genesee river about a mile distant. An artesian well had been sunk on the premises, but the water was so strongly impregnated with sulphur and other impurities that it was thought best not to introduce it into the copper piping in the transformers, although the cost of such a supply would have been practically nothing.

There are three separate water cooled coils in each transformer case, each one controlled by its own valve, so that the amount of water may be controlled as found necessary under various conditions of load.

The necessary transformation from three-phase to two-phase fits

in very well with the natural sub-division of the electrified line into two sections, one of which is about 19 miles long, north of Avon, and the other about 15 miles long, to the south of Avon. The connections were therefore laid out to operate the sections upon separate phases of the two-phase secondary system. Either the T or V connection can be used, the latter method being employed at present. Each one of the active transformers therefore feeds a separate section.

The outgoing 11,000-volt feeders run up to the mezzanine floor directly over the operating room, where they emerge from the building through perforated glass disks set in 18-in. round tiles.

A set of call bells is provided so that when the automatic breakers open a bell is rung in the car inspection shed adjoining. Also, if the temperature of any transformer runs above normal, a bell circuit connected to a thermometer in the top of the transformer tank is similarly made to operate. The station itself does not require the continuous presence of an attendant, which is needed in the case of a rotary converter substation. The working force is so organized that the car repair men are always available for manipulating the substation circuit breakers, and the cost of attendance is thereby reduced to a minimum.

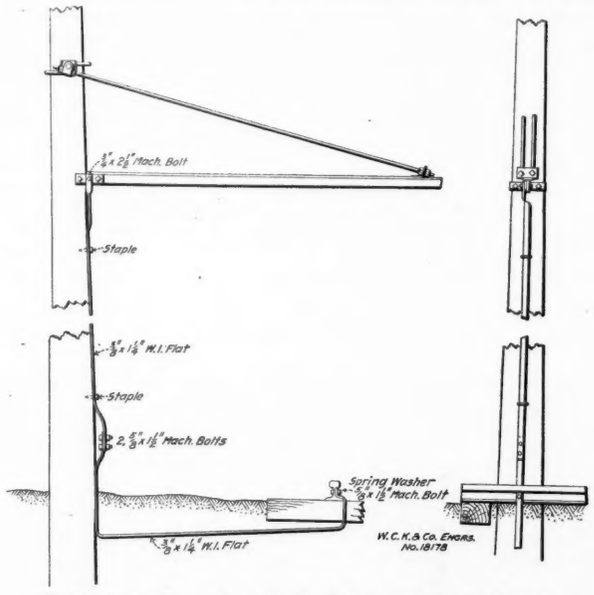
CATENARY TROLLEY CONSTRUCTION.

The overhead trolley construction is in many respects unique. It was the first catenary installation to operate regularly at 11,000 volts. There were few precedents to follow; many of the details of the overhead work are entirely original, and nearly all of them were specially designed for this installation by the engineers who executed the work.

The poles are of chestnut averaging 25 in. in circumference at the top, and about 42 in. at the butt. Most of them are about 35 ft. long, but 40-ft. poles were used where the embankments were narrow and steep, and in span construction. Nearly all the construction is of the bracket type, except at the railroad yards at Rochester, Avon and Mt. Morris, and for some distance at Mortimer, where there is a siding on each side of the main track, which prevented the use of bracket construction. The poles are given about 12 in. rake and are tamped with cobblestones, of which plenty were available from the coarse gravel with which the road is ballasted. Much water bearing gravel and quicksand was encountered in digging the holes and oil-barrels had to be resorted to in many instances to prevent caving in of the holes during pole setting.

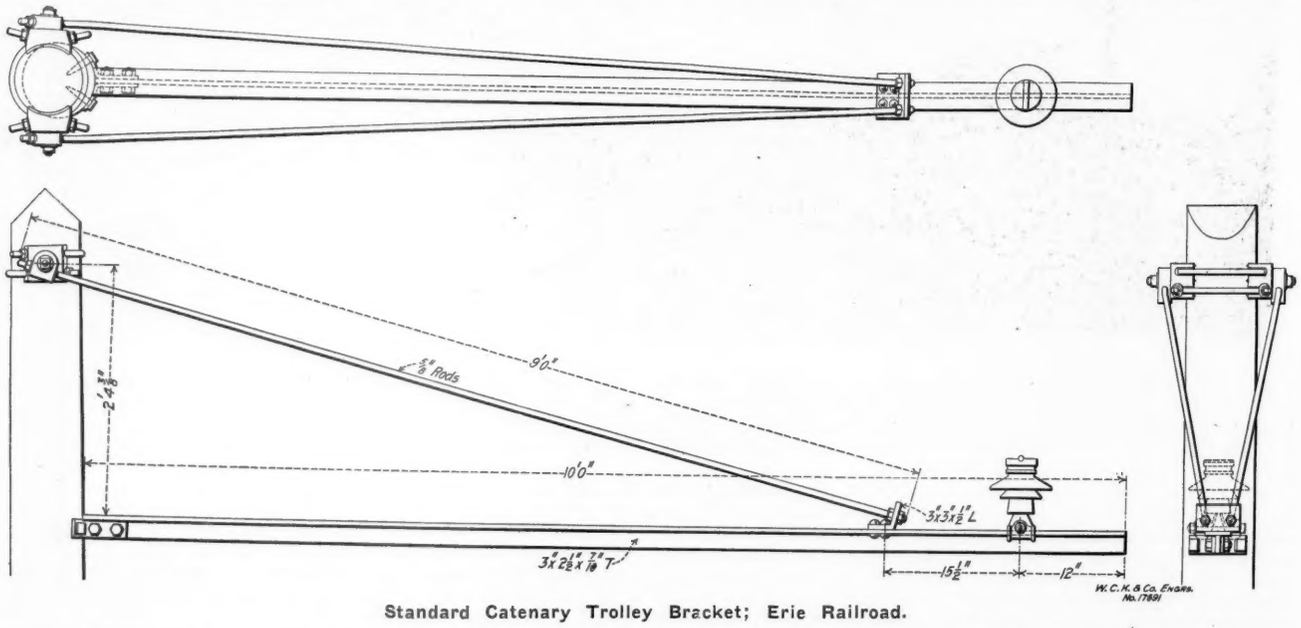
The brackets are of an original design, each consisting of a 3½-in. x 2½-in. tee, 10 ft. long, the heel of which is fastened to the pole by a pair of bent straps, the outer end being supported from the pole top by two ⅝-in. steel truss rods, instead of the single rod commonly used for bracket work. The two rods are attached about 27 in. back from the outer end, and run one to each side of the pole, and are fastened there to a pole clamp devised for this work, which grips the top of the pole instead of requiring the bolt or truss rod to pass through it. In this way the timber of the pole is kept intact and does not have a hole bored through it which will admit moisture and induce rot. The two truss rods are threaded at both ends, and at the upper end each one passes through a small iron casting which is in turn carried on a bolt projecting out from the cast-iron portion of the pole clamp like a trunnion. The whole construction is extremely rigid, and is stronger and more conducive to a long life for the pole than any bracket hitherto used. Where necessary, at switches, extra long brackets are employed, being lengthened by splicing and an extra truss rod being attached by means of a clamp to the outer end of such a bracket and run to the extreme top of the pole.

The insulator pins are of malleable iron, of a type specially devised for this work. The lower portion of the pin was divided and fitted closely over the flanges of the tee bracket, being provided with a single ⅝-in. bolt, by means of which the lower split portion of the pin is clamped securely against the bracket. The brackets and pins were furnished to the engineers' designs by the Electric Service Supplies Co.



Method of Grounding Trolley Poles; Erie Railroad.

The insulator is of the R. Thomas & Sons manufacture, 6⅞ in. in diameter and 6 in. high, made in two parts, but of the three petticoat type, and known as the No. 3,029. It was designed by the engineers especially for this installation. As most of the overhead work was done during the winter months, and had to be rushed, a quick setting cement of litharge and glycerine was used in place of Portland cement, which not only enabled rapid work in construction, but obviated troubles due to the freezing of hydraulic cement while setting.



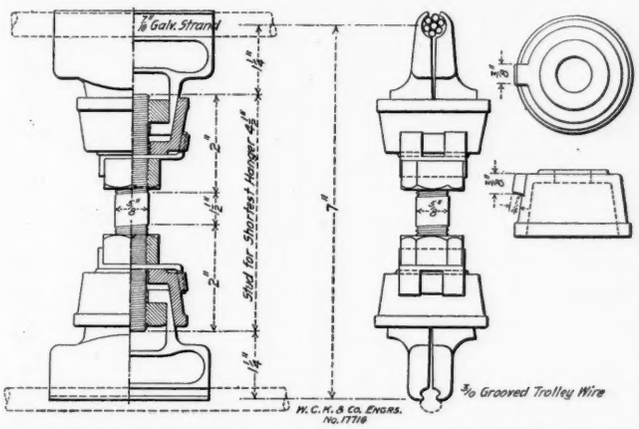
Standard Catenary Trolley Bracket; Erie Railroad.

The insulator pins are ordinarily about 12 in. from the end of the bracket, but there is a space of 27½ in. between the end of the bracket and the point where the truss rods support it, which enables sufficient variation in location of insulator to meet most of the requirements in shifting the alinement of the trolley wire on curves.

The messenger wire is of "extra high strength" steel, furnished

by the American Steel & Wire Co. It is of seven strands, and is 7/16 in. in diameter. Joints are made by using the so-called "open" and "closed" cable sockets, the sockets being sweated on to the abutting ends of the cables and joined by a pin connection through the eyes of the sockets. The trolley wire is No. 000 B. & S. grooved copper, the lengths being spliced with the usual type of soldered splicing sleeve.

The spans on the straight line track are 120 ft. long, and as much shorter than this on curves, as required by the radius of the curvature. The maximum deflection from the center line of the



Standard Catenary Trolley Hanger; Erie Railroad.

track, on curves, is 7 in. each way. The catenary hangers were of the Electric Railway Equipment Co.'s drop-forged type, being modified by the engineers to suit the requirements. The messenger clip and the trolley clip are of the same type but grooved differently to accommodate their respective wires. They are joined by a 5/8-in. iron hanger-rod, with right-hand threads on each end, the longer rods being flattened in the middle to admit of bending them slightly so as to conform to the divergence of the messenger and trolley wire near the ends of the spans. Both trolley and messenger ears are secured in position by jam nuts. This type of suspension was developed especially for this installation, and is so constructed that there is no possibility of parts coming loose and falling apart on account of vibration. It is also very quickly and easily adjusted on the trolley wires. The hangers are spaced every 10 ft.

The steady strain rods are of treated wood of the Westinghouse Electric & Mfg. Co.'s make, and they are mounted at one side of the bracket instead of directly underneath, in order to give sufficient clearance for the pantagraph trolley on curves where the superelevation results in the tilting of the shoe from the horizontal. Each steady strain rod is hinged to a spool type Thomas porcelain strain insulator, which is clamped to one side of the bracket in such a manner that the hinged end of the rod is almost at the elevation of the top of the tee bracket. The method of attaching the steady strain insulators to the bracket is such that they can readily be shifted along the bracket to follow up any change in alinement of the trolley wire that may be required by curvature or for any other reason. The clamps holding the steady strain insulators are of 3-in. x 3/8-in. bent iron. The spool type insulators are cemented on to pieces of 3/4-in. pipe, through which passes the 5/8-in. eye bolt by means of which they are attached to the bent irons. Steady strains are used only on curves and turnouts and were not found necessary on tangent track.

The tie wires are of No. 9 Extra BB galvanized telegraph wire, because it was thought best not to make too rigid an attachment between the messenger wire and the insulator; so that if a bracket became detached from the pole for any reason, its weight and the shock of detachment would tear the wire clear from the messenger and allow the bracket to fall entirely away from the wire and reduce the chance of steam railroad trains colliding with it. An accident to the electrical equipment of a railroad operating both steam and electric trains may shut down the electric service, but will not automatically place any check upon the steam service, so that accidents to steam trains must be guarded against, as a steam train might easily be wrecked by an obstruction which would automatically prevent power from being supplied to an electric train. This was one of the reasons for installing the system of "ground rods" from the brackets to the rails, which is carried out throughout the installation. Every bracket is grounded to the rail so that an insulator failure will instantly throw off the power, as it will cause a complete metallic short-circuit. There is thus no danger of setting the wooden poles on fire, which would be possible if this precaution were not taken. The burning of a wooden pole would not of itself necessarily cripple the electric service, but it would be quite likely to cause an obstruction dangerous to the passage of steam trains which are, of course, independent of any disturbances of the electric motive power system. Up to the present time, however, there have been no cases where the overhead construction has caused any obstruction to the passage of the steam traffic. The ground rods consist of 3/8-in. x 1¼-in. flat steel, their upper and lower ends being bolted to track rail and bracket respectively.

The span construction is as nearly as possible similar to the bracket construction, and uses the same type of pin and insulator. A piece of 3-in. x 2½-in. tee about 30 in. long is suspended from the span wire by hangers of galvanized strand cable, adjustable in length, and fastened to the span wire cable by specially designed clips, the construction forming a sort of stirrup upon which the pin and insulator are carried. The messenger wire rests upon the insulator just as in the case of regular bracket construction. This form is used, not only for spans where there is but one track, but also in the yards at Avon and Rochester, where three or four parallel tracks are electrified. Span construction, in general, was only used where conditions absolutely required it.

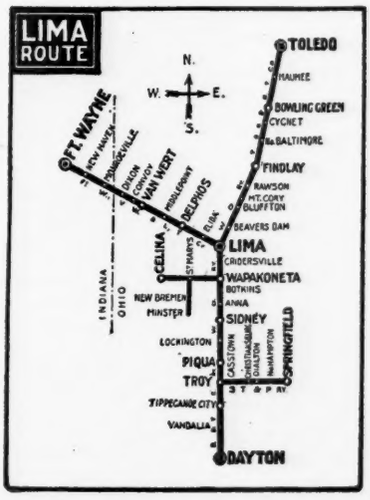
The Rochester yard was a difficult piece of construction on account of the distance between supports which reaches a maximum of 94 ft., where spanning seven tracks, four of which are electrified, and also on account of the uncertain nature of the soil which on the river bank is filled in with gravel and cinders. For these long spans, where it was impossible to use guys of the usual type (the river bank being on one side and the main highway, which gives teams access for loading and unloading of freight cars, on the other side), it became necessary to use self-supporting span construction, and this was done by using the "Tripartite" type of steel pole, set in concrete. This type of pole being constructed of re-rolled Bessemer steel rails is less subject to rust, and consequently more durable than any other available type of metal pole, and all of its surfaces are always open and easy of inspection. On account of the great tensile strength of the material, there is considerable saving in weight, and the fact that it was a standard product, enabled quicker delivery to be made than if special riveted poles of structural steel shapes had been designed for these locations. The span wires consist of the regular messenger cable fitted with cable sockets sweated on at each end, the same being fastened to turnbuckles and pole collars at the tops of the poles. There are two span cables at each pair of poles, the upper one being used to carry the weight, the lower one acting to steady the arrangement and also to act as a relay in case of an accident to the upper span. Similar construction was also used at Avon, where guying of side poles was not always possible.

(To be concluded.)

Electric Railway Competition.

BY RAY MORRIS,
Managing Editor, *Railroad Gazette.*

The *Railroad Gazette* has watched trolley competition closely ever since the inauguration of that competition about 1895, and has from time to time printed accounts of the existing situation in localities where the competition was most severe, and also of the general situation throughout the country. The last one of these general round-ups was printed May 12, 1905, and the method used in obtaining material for the present paper is the same that was used then; that is to say, a letter was written to every interurban line in the country with the request for specific information in regard to through runs, the time occupied in making these runs, the number of cars per day in each direction which made the through run named, steam competition, rates charged by the trolley company, and also by the steam company for its cheapest form of ticket between the points named, and we also inquired whether or not the steam railroad had reduced its fares since the onset of the trolley competition. The accompanying tables contain, in summarized form, the results of these inquiries. It will be seen that the first table includes all interurban runs of 10 miles or more concerning which replies were made to our inquiry. The total number of



Through Routes from Lima.
Toledo to Dayton, 160 miles.

such runs reported was 111, and the total mileage which they covered amounted to 3,361. The average speed of these cars was 19.9 miles an hour, and the average daily service consisted of a fraction under 19 cars in each direction. The average cheapest form of fare on the electric cars cost 1.47 cents per mile, while the average cheapest form of fare on competing steam lines cost 1.85 cents per mile.

TABLE OF INTERURBAN RUNS OF TEN MILES OR MORE.

Road.	Miles.	Speed, miles pr hour.	Cars.	Lowest rate, c. pr m.	Steam competitor.	Lowest rate c. pr m.
CALIFORNIA.						
Northern Electric Co.	96.7	25.9	7	2.74	Southern Pac.	*1.05[1]
Petaluma & Santa Rosa.	23.3	23	10	2.15	N. W. Pacific.	2.00[2]
COLORADO.						
Denver & Northw'n Ry.	10	20	15	1.50	Colo. & S.	2.00[3]
CONNECTICUT.						
Farmington St. Ry.	14	15	24	1.43	.....	....
Groton & Stonington.	19.7	14	33	1.36	N.Y.,N.H. & H.	2.00
Prov., R. I.-Danielson, Ct.	35	13	14	1.86	Non-compet.	....
DELAWARE.						
Cons. Rys., Lt. & P.	11.4	19.5	..	1.53	.....	....
GEORGIA.						
Augusta-Aiken Ry. & El.	23.5	15.7	30	1.07	Southern Ry.	2.13
INDIAN TERRITORY.						
Choctaw Ry. & Ltg.	18	18	15	2.22	Rock Island	3.00
IOWA.						
Inter-Urban Ry.	36	22.7	11	1.50	.....	....*
ILLINOIS.						
Aurora, DeKalb & Rockford	30	20	4	2.00	Chic. & N.-W.	2.00
Chicago & Joliet Elec.	30	20	30	....	Chic. & Alton.	2.00[5]
Illinois Valley Ry.	60	20	18	2.00	Rock Island	2.06
Rock Island Southern.	18	18	16	1.67	C., B. & Q.	1.89
Sterling, Dixon & E'n.	14.7	17.6	18	1.70	Chic. & N.-W.	2.00
IDAHO-WASH.						
Spokane & Inland Empire.	30	43	14	1.84	Nor. Pac.	1.84[6]
INDIANA.						
Chic., So. Bend & Nor. Ind.	52	27.6	8	1.63	L.S. & M.S. & Big 4 (part)	1.90
Ft. Wayne & Springfield Tr.	21	16	20	1.90	Grd. Rap. & I.	2.20
Ft. Wayne & Wabash Val.	137	31.1	4	1.79	Lake E. & W.	1.79
Ft. Wayne & Wabash Val.	114	28.6	..	1.98	Wabash	1.98
Ind. Col. & Southern Tr.	42	26.5	2	1.55	Penn.	2.00[7]
Ind., Crawfdv. & Wn. Tr.	45	28.4	16	1.56	Big Four	1.56[8]
Indiana Union Traction.	72	30	..	1.32	Big Four	1.50
Kokomo, Marion & Wn.	30	26	10	1.50	T., St. L. & W.	2.16[9]
Louisville (Ky.) & Nthn.	18	23.6	1	0.74	B. & O. S. W.	2.11
KANSAS.						
Kansas City Wn.	30	20	18	1.25	Mo., Pac.; C., B. & Q.; C. G. W., etc.	1.70[10]
MAINE.						
Bangor Ry. & Elec.	26	18.4	2	1.92	.....	....
Bangor Ry. & Elec.	15	12	..	0.67	Me. Central	....
Lewiston, Aug., & Wat'v.	29	14.5	28	0.86	Me. Central	1.20[11]
Somerset Traction	12.5	12.5	12	2.40	.....	....
MARYLAND.						
Hagerstown & Boonsboro.	13	13	8	2	No comp.	....
MASSACHUSETTS.						
Berkshire St. Ry.	29	17.4	35	1.20	N.Y.,N.H. & H.	2.00
Berkshire St. Ry.	21	16.8	36	1.43	B. & A.	2.00
Berkshire St. Ry.	19	15.2	35	1.57	B. & M.	....
Boston & Worcester.	40.6	17.4	29	1.23	B. & A.	2.20
Boston & Worcester.	20.1	16	36	1.12	B. & A.	2.20
Brockton & Plymouth.	22.5	11.7	8	1.11	N.Y.,N.H. & H.	2.00
Citizens' Elec. (Newb'pt).	11	11	30	1.00	B. & M. (part)	....[12]
Citizens' Elec. (Newb'pt).	15	15	..	1.34	No comp.	....
Conc., Mayn'rd & Hudson.	15	15	60	1.33	B. & M.	1.66
Conn. Valley S. R.	23	15.4	16	1.04	B. & M.	1.30[13]
Holyoke St. Ry.	23	12.6	32	0.87	B. & M.	0.87[14]
Milford & Uxbridge St. Ry.	21	14	30	1.19	B. & A. (part)	1.15
Newton St. Ry.	28	12.1	32	1.25	B. & M.	1.45
Norfolk & Bristol St. Ry.	14	12.5	31	1.43	.....	....
Prov. (R. I.) & Fall River	18	13.6	32	1.66	N.Y.,N.H. & H.	1.66[15]
Springfield & Worcester.	60	17.1	14	1.33	B. & A.	1.83
Taunton & Pawtkt. (R. I.).	18	14	16	1.11	New Haven	2.00[16]
MICHIGAN.						
Ben. Har.-St. Joe R.& Lt.	13	13	16	2.31	Big Four	2.00
Detroit, Jackson & Chic.	76	27.6	3	1.32	Mich. Cent.	....
Det., Monroe & Toledo (O.)	57	28.5	22	1.32	Lk. Sh., Mich. Cen., Pere M.	1.32[17]
Grand Rap., Hol. & Chic.	34	25.5	2	1.25	Pere M. (part)	2.00
Houghton County S. R.	16.5	12	36	1.51	Copper Range. Mln. Range	2.43
Mich. United Rys.	71	23.6	7	1.48	Mich. Cent.	1.90[18]
Mich. United Rys.	46	32.4	20	....	Mich. Cent.	....[19]
Saginaw Val. Tr.	13.7	16.4	15	1.09	Pere Marq., Gr. Trunk, Mich. Cent.	1.82
MINNESOTA.						
Twin City Rap. Tr.	18	28.4	30	1	Minn. & St. L.	1.00
MISSISSIPPI.						
Gulfport & Miss. Coast Tr.	20	16	21	0.71	L. & N.	0.71
MISSOURI.						
Metrop. St. Ry. (Kas. City)	12	..	..	0.83	2 roads	1.00
NEW HAMPSHIRE.						
Manchester St. Ry.	18.2	19.9	30	1.37	B. & M.	*0.73
NEW JERSEY.						
Jersey Central Traction.	18.9	12.6	..	..	.....	....
N. J. & Hud. R. Ry. & Fry.	14	14	41	..	Erie, part way	....[20]
Public Service Corporation	28.8	..	..	..	.....	....
NEW YORK.						
Brooklyn Rapid Tr.	13.8	12.2	24	0.72	.....	....
Chautauqua Tr.	34	18.1	27	0.57	J. C. & L. E.	2.00[21]
Elmira Water, Lt. & R. R.	22.5	18.8	13	1.11	Nor. Cent.	2.00
Fonda, J. & Glov. R. R.	33	25.5	15	..	N. Y. Central.	....
International Ry.	37.5	26.7	8	0.39	N. Y. Central	....[22]
International Ry.	25	25	1	0.58	N. Y. Cent., Leh. Val., Erie	0.58[23]
Rochester & En. Rapid.	44	27.7	3	1.42	N. Y. Central	2.00[24]
Rochester & En. Rapid.	28	26.6	..	1.34	N. Y. Central.	2.00[25]
Schenectady Ry.	22.2	22.2	37	1	D. & H.	2.00
Syr., L. S. & Nor.	14	30	1	1.43	D., L. & W.	1.43
Utica & Mohawk Valley.	38	†48	40	1.45	N. Y. Central.	2.00
OHIO.						
Cincin. & Col. Tr.	53	26.5	10	1.90	B. & O. S. W.	1.90
Clev., Painesv. & En.	58.5	25.1	20	1.62	L. S. & M. S., N.Y.C. & St.L	1.88
Clev. S. W. & Col.	56	24.9	4	1.78	L. S. & M. S.	1.78
Mansfield R., L. & P.	12	16	1	2.08	B. & O.	2.00
Springfield & Xenia.	20	21.8	19	2	Penn.	2.50
Toledo & Western.	59	21.5	5	1.69	C., H. & D.	1.69
Toledo & Western.	37	23.4	3	1.62	D., T. & I., L. S. & M. S., Wabash	1.62
Tol., Ft. Clint. & Lakeside.	55	28.7	..	0.91	L. S. & M. S., Lksde & Md.	1.59
Tol. Urban & Int.	160	27	8	1.69	T. & O. C., C., H. & D., L. E. & W.	1.69
OREGON-WASH.						
N. W. Gas & El. Co.	14	28	18	2.50	O. R. & N.	2.85[26]
Portland R., L. & P. Co.	37	19	8	1.15	.....	....
Portland R., L. & P. Co.	15	13	29	*1.33	.....	....
PENNSYLVANIA.						
Altoona & Log. Val. El.	15	15	30	1.67	Penn.	2.00
Chambersb. & Gettysb. El.	10	10	2	1.25	.....	....
Easton Transit Co.	11	15	32	1.36	C. R.R. of N.J.	2.00
Easton Transit Co.	11.8	16	19	1.27	Lehigh Val.	*0.82
Northern Cambria St. Ry.	10	15	3	2.40	Penn.	3.00
N. J. & Pa. Traction.	17	20.4	18	1.76	Penn.	*1.06
Phila. & Easton.	32	17.4	17	1.72	Non-compet.	....
Valley Traction Co.	23	35	20	1.30	C. V., P. & R.	*0.7
Westchester St. Ry.	14	14	..	..	Penn.	....
West Penn. Rys.	40	16	36	1.50	Penn.	2.5
York County Traction.	13	15.4	15	1.50	Md. & Penn.	*1.00[27]
RHODE ISLAND.						
Mil'd, Attleboro & Woon'st.	12.9	17.2	19	1.16	Non-compet.	....
Mil'd, Attleboro & Woon'st.	12.5	12.5	19	1.20	Non-compet.	....
Rhode Island Company.	17.7	11.8	32	1.18	N. H. El. serv.	....
Sea View Railroad.	23	25.1	12	1.63	New Haven	2.00
SOUTH CAROLINA (see also Georgia).						
Anderson Traction Co.	10	20	23	2	Southern Ry.	3.1
WASHINGTON (see also Oregon).						
Everett Ry., Lt. & Water.	10	20	9	2.50	Gt. Nor.	*1.5[28]
Puget Sound Electric.	36.5	29	18	1.37	Nor. Pac.	3.4[29]
Seattle Electric Co.	36	28	14	1.67	Nor. Pac.	2.77
Seattle, Renton & Southern	12.5	15	17	0.80	.....	....
Spokane & Inland Empire.	76	25.3	6	2.40	Nor. Pac. and O. R.R. & N.	2.90
WEST VIRGINIA.						
Camd. Interst. (W.Va.&Ky.)	16	13	76	0.90	Ches. & Ohio.	2.25[30]
Pan-Handle Traction	17	17	30	1.47	P.,C.,C. & St.L	2.06[31]
WISCONSIN.						
Green Bay Traction Co.	23	25	15	1.63	3, part way	2.00
Winnebago Traction Co.	13	15.6	17	1.92	Chic. & N.-W., and Wis. Cen.	2.00
Average or total.	3,361	19.9	18.9	1.47	.....	1.85

* Commutation rate.
† Maximum, not average; incorrectly reported.
[1] Trolley line newly opened for half the distance.
[2] Steam fares reduced from 5 cts. per mile to 2 cts. per mile by trolley competition. Steam has shortest through route and does three-fourths of the through business. Trolley gets nearly all short haul.
[3] Trolley gets most of the business on holidays; all of it, other days.
[4] Electric railway does 97 per cent. of the business.
[5] Steam road abandoned two local trains, result of electric competition.
[6] Trolley time and distance exclusive of 2½ miles in city streets.
[7] Trolley does 90 per cent. of the business.
[8] Steam fare reduced from 2.62 cts. per mile by trolley competition.
[9] Steam road reduced fare 10 cts., but did not thereby affect trolley business.
[10] Electricity does 95 per cent. of business.
[11] Steam fare reduced by competition from $1.05 to 35 cents.
[12] 91 per cent. of business done by electric road in competing territory.
[13] Steam fare reduced from 50 to 30 cents.
[14] Reduction by steam road of 10 cents.
[15] Competes with electrified branch of New Haven road.
[16] Steam does three-fourths rush-hour commutation business; electricity does most at other hours.
[17] Steam min. tickets more restricted than electric.
[18] 46 miles of this is third rail.
[19] Third rail, included in above.
[20] Steam fare less in competing territory, but street railway has developed and holds most of business.
[21] Steam has discontinued all but one round trip daily; electric sells through tickets.
[22] Electric has two-thirds of business.
[23] Electric has most of the business.
[24] Electric does 90 per cent. of business.
[25] Electric does 99 per cent. of business.
[26] 190 electric tickets sold to one steam ticket.
[27] Trolley does all the business; steam commutation tickets restricted.
[28] Electric road does 95 per cent. of the business.
[29] Third rail and trolley; Northern Pacific cancelled all local trains between Tacoma & Seattle after electric began.
[30] Trolley does almost all the business.
[31] Steam rate reduced from 2.94 by trolley competition.

Certain general results are quite clearly shown by this compilation. It will be noted that in a number of states, especially in the eastern and central part of the country, the steam railroad fare has this year been reduced to 2 cents a mile by legislative action

The effect which this will have on trolley competition is as yet problematical. Railroads in Ohio, Indiana and other highly competitive states have generally found it unprofitable to meet trolley competition with a direct cut in fares, but now that this cut has been forced upon them, it will remain to be seen whether or not

On the Road.

Lands the traveling man in heart of every business district with baggage; no cartage.

End of the Week.

A record-breaking trip because he traveled by the electric. Three towns to one the old way.

the other advantages of the trolley car over the steam train; that is to say, the frequent service at easily remembered intervals, and the fact that cars run through city streets and past dwelling houses, shops and farms, will balance the newly reduced rate of fare on the steam railroads. It seems highly probable that the street and interurban railway companies will not at all feel the effect of the reduction in fares. Unfortunately, the answers received to the question relative to the existing state of competition between steam and electric roads were very meagre. The writer hoped to get a general statement from each company in regard to the respective amount of business which it was doing as compared with its steam competitor, but the replies received were so few in number that they do not permit of generalization. Some of the answers in specific instances are of great interest, however; thus, the Petaluma & Santa Rosa Company, in California, reports that its steam competitor reduced its fares from 5 cents a mile to 2 cents a mile after the trolley road commenced business, that the steam railroad has the shortest through route and does three-fourths of the through business, but that the trolley gets almost all the short-haul traffic. It is probable that this result is typical of the experience of a very large number of railroad managers; that is to say, where they have to face the competition of an interurban road 20 or 30 miles long, they can scarcely hope to get the short-haul traffic between these points, but are quite likely to get the through haul, especially in hours of maximum travel, if they run a good service at an attractive price. Another example of just this thing is found in the case of the Taunton & Pawtucket Street Railway, 18 miles long, which reports that its competitor, the New York, New Haven & Hartford, does three-fourths of the rush-hour commutation business, while the electric road does most of the business at other hours.

The figures shown in the table for the average cheapest form of fare on the electric cars, 1.47 cents, is a very interesting one.

The Old Way. Freight.

Shipper No. 1: "Great Scott! I ordered those goods 30 days ago by the steam line and not here yet."

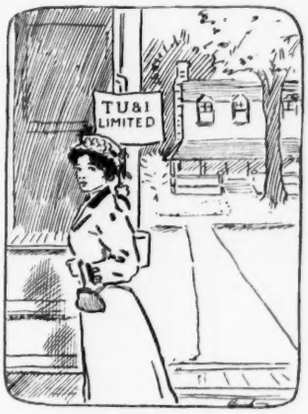
The New.

Shipper No. 2: "Yes, I ordered my goods by telephone and here they are the same day. It used to take a week."

In a large number of cases this rate is below the ordinary round-trip rate, but it is without a single exception less restricted than the low railroad commutation rates with which it has to compete. The minimum fares on the steam railroads are not infrequently obtainable through the use of monthly commutation tickets, an equivalent form for which on the trolley roads is a ticket entitling the passenger to the same number of rides, but without time limitation. Nothing was more striking in looking over the replies to inquiries than this fact, than that the steam railroads quite invariably found it advisable to restrict the use of their cheapest form of ticket, while the trolley roads with equal unanimity had devised a similar form, but were less anxious to impose restrictions with regard to the user, the time limit or the amount of baggage which might be carried.

The accompanying illustrations taken from an interurban railway circular show very well the controlling reasons which have contributed to the great success of interurban roads in short-haul territory, which can practically be summed up in the word convenience. It is not apparent that the steam railroads are ever going to be able to win back lost short-haul business, and it is very doubtful if they want this business. It is far better that suburban and interurban territory should be built up as it is now being built up, so as to supply long-haul passenger traffic, and, above all, freight traffic to steam railroads. In this connection, the policy of the New York, New Haven & Hartford, in controlling substantially all the trolley roads in its territory to a total of over 1,500 miles of electric line, is extremely interesting, and it seems not unlikely that this policy might prove a wise one for imitation in many points of the country outside New England.

The great center of interurban development in this country is Indianapolis, where the steam railroads are much harassed by the competition of the long, fast interurban lines, as may be judged by a glance at a table showing two through lines over 100 miles



Morning.

Gets on the car at her door and lands in the shopping district without change.

Evening.

No dirt, no smoke, no cinders. A successful day, and all because she goes "the electric way."

long, and six through lines over 40 miles long in the state. Next to Indianapolis probably comes Dayton, then Detroit, then Toledo, then Cleveland, Columbus, Boston and Cincinnati in the order named, and the steam railroads most interested in the suburban and interurban traffic in the vicinity of these cities have not in a single instance made any strong effort to get the trolley lines into their own hands. It seems almost inevitable that the tendency of development for the next 10 or 15 years will be for this form of combination between steam and street railways to take place, so long as the laws remain open and permit it. In England it is impossible for a steam railroad to own and operate a street railway, and it may be only a few years before similar restrictions are placed in this country. In the meantime there are undoubtedly a very large number of places in this country where it would be much to the ultimate profit of the steam railroads to control the electric lines.

As regards the general tendency of interurban development, it is noteworthy that all the important trolley groups of the present day lie between the Great Lakes and the Ohio river, and that they have all arisen as a result of the process of coupling up short local lines originally built in cities and towns and then gradually extended until their ends met. This characteristic is, of course, radically different from that which characterized the growth of the steam railroads in the country. The steam railroads were almost always pushed out to connect distant points, while the trolley lines, at least until very recently, always started as local enterprises and then outgrew their bounds and crowded one another.

Assuming, therefore, that this process of coupling up short lines is the chief characteristic of American interurban development, it is

noteworthy that the process is about completed in the state of Indiana. There are almost no isolated small lines left in the state, where there are some 41 operating street railway companies, all but three or four of which connect with each other. No such complete development has taken place in Illinois or even in Ohio as yet, although these two states perhaps come next to Indiana in interurban importance, and, after mentioning a fairly active state of interurban development in Michigan, and also in New York, Massachusetts, Pennsylvania, New Jersey and Connecticut, of the eastern states, and also in the more densely populated part of the state of Washington, the noteworthy fact is that the rest of the country has scarcely begun building interurban lines at all.

According to the estimate made by the *Street Railway Journal*, there were 63 companies in the year 1906 which earned $1,000,000 or more, as against 53 companies in 1905. There were 44 companies in 1906 which earned between $500,000 and $1,000,000, as against 30 companies in 1905. There were 184 companies in 1906 which earned between $100,000 and $500,000; 100 companies which earned between $50,000 and $100,000, and 90 companies which earned between $25,000 and $50,000, gross earnings in each case being the figure quoted. There were 15 companies which earned more than $5,000,000 each in 1906, as against 14 in 1905, and 20 companies which earned over $4,000,000 in 1906, as against 16 in 1905. The most interesting part of the figures presented was that decreases were practically non-existent, while each of the groups of roads, arranged according to earnings, showed a very substantial gain over 1905. Thus, as we pointed out in reviewing "American Street Railway Investments" last July, the gain of the companies in Group One, having gross receipts of over $1,000,000, was 16 per cent. in 1906 over 1905; the gain in Group Two, having gross receipts between $500,000 and $1,000,000, was 31 per cent.; that of the third group, having receipts between $100,000 and $500,000, was over 24 per cent., and the gain of the group having gross receipts between $50,000 and $100,000, was 29 per cent. When we reflect on these figures and then upon the vast areas in the South and West, where there is practically no street railway mileage, the chances for ultimate profitable development seem almost unlimited.

Table B is a selection from table A of interurban runs of 20 miles or more at an average speed of 20 miles per hour or faster, and is strictly comparable with the table which we prepared in 1905. At this time we obtained an average of 26 miles an hour as the speed of the fastest cars and an average minimum fare of 1.41 cents per mile for the through runs named. This year the average rate of speed is 25.9 miles an hour, practically the same as that of 1905, but the average rate of fare has been increased to 1.56 cents. A number of companies stated in 1905 that they thought fares were too low and there has been a concerted effort since then in several states, noteworthy in Ohio, to increase them.

TABLE OF INTERURBAN RUNS OF 20 MILES OR MORE, AT AN AVERAGE SPEED OF 20 MILES PER HOUR OR FASTER.

Road.	Miles.	Speed, miles pr hour.	Ro'nd trips.	Lowest rate, c. pr m.	Steam competitor.	Lowest rate c. pr m.
CALIFORNIA.						
Northern Elec. Co.	96.7	25.9	7	2.74	So. Pac.	*1.05[1]
Petaluma & San. Rosa.	23.3	23	10	2.13	N. W. Pac	2.00[2]
IDAHO.						
Spokane & Inland Emp.	30	43	14	1.84	Nor. Pac.	1.84[3]
ILLINOIS.						
Aurora, DeK. & Rockford	30	20	4	2.00	C. & N.-W.	2.00
Illinois Valley Ry.	60	20	18	2.00	Rock Island	2.00
Chicago & Joliet Elec.	30	20	30	..	Chic. & Alton.	2.00[4]
INDIANA.						
Chic., So. Bend & N. Ind.	52	27.6	8	1.63	L.S. & M.S. & Big 4 (part)	1.90
Indiana Union Tr. / Ft. Wyn. & Wab. Val. Tr.	137	31.1	4	1.79	L. E. & W.	1.79
Ft. Wayne & Wab. Val. Tr.	114	28.6	..	1.98	Wabash	1.98
Indiana Union Traction.	72	30	..	1.32	Big Four	1.50
Indianap., Craw. & Wn.	45	28.4	16	1.56	Big Four	1.56
Indianap., Col. & So.	42	26.5	10	1.90	Penn.	2.00[5]
Kokomo, Mar. & Wn.	30	26	about 10	1.50	T., S. L. & W.	2.16[6]
IOWA.						
Inter-Urban Ry.	36	22.7	11	1.50		....[7]
KANSAS.						
Kansas City Western	30	20	18	1.25	Mo. Pac. / C., B. & Q. / C. G.-W., &c.	1.7[12]
MAINE.						
Lewiston, Aug. & Waterville	29	14.5	28	0.86	Me. Central	1.2[9]
MICHIGAN.						
Detroit, Jackson & Chicago	76	27.6	3	1.32	Mich. Cent.	....
Detroit, Monroe & Toledo	57	28.5	22	1.32	Lake Shore / Mich. Cent. / Pere. Marq.	1.32[9]
Grand Rap., Holl. & Chic	34	25.5	2	1.25	P. M., part way	2.0
Michigan United Rys.	71	23.6	7	1.48	Mich. Cent.	1.9[10]
do. (part of above service)	46	32.4	20	..	Mich. Cent.	....[11]
NEW YORK.						
Fonda, Johnst. & Gloversv.	33	25.5	15	..	N. Y. Central.	....
Internat. Ry. Co.	37.5	26.7	8	*0.39	N. Y. Central.	*0.39[14]
do. (Buffalo-Niagara)	25	25	1	*0.58	N. Y. Cent. / Lehigh Val. / Erie	*0.58[14]
Roch. & E'n Rapid.	44	27.7	3	1.42	N. Y. Central.	2.00[15]
Roch. & E'n Rapid.	28	26.6	..	1.34	N. Y. Central.	2.00[15]
Schenectady Ry.	22.2	22.2	37	1.00	Del. & Hudson	2.00
Utica & Mohawk Val.	38	†48	40	1.45	N. Y. Central.	2.00[17]
OHIO.						
Cincinnati & Col. Tr. Co.	53	26.5	10	1.90	B. & O. S. W.	1.90
Cleveland, Painsv. & En.	58.5	25.1	20	1.62	L. S. & M. S., N.Y.C. & St.L	1.88
Cleveland. S. W. & Col.	56	24.9	4	1.78	L. S. & M. S.	1.78
Springfield & Xenia Ry.	20	21.8	19	2.00	Penn.	2.50
Tol., Pt. Clinton & Lakeside	55	28.7	..	0.91	L. S. & M. S., Lksde & Mrb	1.59
Toledo & Western.	59	21.5	5	1.69	C., H. & D.	1.69
do. (Tol.-Adrian, Mich.)	37	23.4	3	1.62	D., T. & I. / L. S. & M. S. / Wabash	About 1.62
Toledo Urban & Inter.	160	27.0	8	1.69	T. & O. C. / C., H. & D. / L. E. & W.	*1.69
PENNSYLVANIA.						
Valley Traction Co.	23	†35.0	20	1.30	C. V., P. & R.	*0.7
RHODE ISLAND.						
Sea View R. R.	23	25.1	12	1.63	N.Y.,N.H. & H.	2.0
WASHINGTON.						
Puget Sound Elec.	36.5	29	18	1.37	Nor. Pac.	3.4[18]
Seattle Elec. Co.	36	28	14	1.67	Nor. Pac.	2.77
Spokane & Inland Empire.	76	25.3	6	2.40	N.P., O.R. & N	2.9[19]
WISCONSIN.						
Green Bay Traction	23	25	about 15	1.63	Partial	2.0
Total or average	2,085	25.9	13	1.56		1.82

* Commutation rate.
† Maximum, not average; incorrectly reported.
[1] Trolley line newly opened for half the distance.
[2] Steam fares reduced from 5 cents per mile to 2 by trolley competition; steam has shortest through route and does three-quarters through business; trolley gets nearly all short haul.
[3] Running time excludes 2½ miles on slow schedule in city streets. Trains of 2 to 4 cars are run.
[4] Steam road has abandoned two local trains, result of competition.
[5] Trolley does 90 per cent. of business.
[6] 10 per cent. reduction in steam fare has not affected trolley business.
[7] Electric road has 97 per cent. of business.
[8] Since trolley began, steam fare reduced from $1.05 to 35 cents.
[9] Minimum fare more restricted on steam than on trolley.
[10] Third rail for 46 miles.
[11] Third rail.
[12] Electric does 95 per cent. of business.
[13] Electric does two-thirds of business; steam commutation more restricted than electric.
[14] Electric does most of the business; steam commutation more restricted.
[15] 90 per cent. of business done by electric.
[16] 99 per cent. of business done by electric.
[17] Steam road owns trolley road.
[18] Third rail and trolley; Northern Pacific cancelled all local trains between Tacoma and Seattle after electric began operation.
[19] For additional service, see under Idaho.

The "convenience" feature of trolley service, mentioned above, has always seemed to us to outweigh the specific feature of low fares, or at least of extremely low fares, as a stimulation of traffic, and it seems wholly probable that the extremely low fares quoted in some instances can be advanced somewhat without materially affecting business. For example, the International Railway Company, in competition with the New York Central, gives a minimum commutation fare of 0.39 cents per mile; the Toledo, Port Clinton & Lakeside, in Ohio, a minimum fare of 0.91 cents, and the Lewiston, Augusta & Waterville, in Maine, a minimum fare of 0.86 cents. We cannot see any reason why a trolley road or a steam road, either, should carry passengers at a figure below a cent a mile, except possibly in the case of regular daily commutation traffic, which needs special inducements to make it move long distances, but this is not the kind of work which a trolley line is best fitted to do.

Even a casual review of the facts and figures which have been stated in this paper must show that the interurban business in this country is one of very great promise which has as yet scarcely begun to be developed. The conclusion is irresistible—that the steam railroads most affected should work in line with this movement and not contrary to it, and make of the trolley lines useful friends instead of competitors.

A firm which furnished materials for the Prussian State Railroads made presents to clerks who had to do with ordering and accepting of the materials under the immediate direction of higher officials. These clerks regarded these presents as intended to influence their official acts in favor of this firm, and notified their superior officers. Suit was brought against the firm for slander, and it was found guilty. The court found that, whether accepted or not, the offering of such presents is an insult, as assuming the employees to be capable of a dishonorable act. The Railroad Minister has called attention of all employees to this decision and declared that severe measures will be taken against all who accept and all who offer gratuities of this kind; while those who offer them will be excluded from all business with the State Railroads thereafter.

GENERAL NEWS SECTION

NOTES.

The city council of El Paso, Tex., has passed an ordinance prohibiting ticket brokers from doing business in that city.

Kansas and Michigan railroads are abolishing excursion rates with a view to making 2 cents a minimum as well as a maximum.

The New York Central will restore to its telegraphers and signal men the old rates of pay, which were reduced when the eight-hour law went into effect.

The Atchison, Topeka & Santa Fe has made an increase of two cents an hour in the pay of machinists and boilermakers and one and a half cents an hour in the pay of helpers in the shops.

Eleven residents of Hollis, L. I., have begun suits in the Supreme Court against the Long Island Railroad for injunctions to restrain it from the use of soft coal. Each of the plaintiffs demands money damages.

A suit in equity has been begun before the United States District Court at Atlanta, Ga., by the Central of Georgia, which alleges that the 2½-cent maximum passenger rate ordered by the state railroad commission is confiscatory.

It is stated that a contract has been entered into between the Erie and the Baldwin Locomotive Works whereby the latter is to repair one engine a day for the road. The work is to be done in the Eddystone shops near Philadelphia.

Trainmen and shopmen are striking on the United Railways (Havana, Cuba), and strike breakers have recently been brought in from the United States. There is no strike on the Van Horne system or the Cuba Eastern or the Cuban Central.

At the annual meeting of the Boston & Maine stockholders last Wednesday, less shares were voted than were needed for a quorum to elect Directors. This was because the 109,949 shares held by the New Haven, could not, under the act passed by the Massachusetts legislature last June, be voted.

The principal railroads of South Dakota have secured in the United States Court a temporary injunction against the enforcement of the reduction in passenger rates from 3 cents a mile to 2½ cents, which had been ordered by the State Railroad Commission to go into effect October 15.

M. V. Richards, head of the Land and Industrial Department of the Southern Railway, is now making a tour of the southern states with a company of 100 cotton spinners and manufacturers from Europe who desire to study the cotton industry of the south. The visitors come from England, Germany, Austria, France, Belgium, Italy and Portugal.

Mrs. Potter Palmer, who came over from Liverpool on the Cunard steamship "Lusitania," September 13, made the trip from Liverpool to Chicago in 6 days, 11 hours, 45 minutes, apparent time —or 6 days, 16 hours, 45 minutes, actual time. Mrs. Palmer left Liverpool September 7, 9.10 p.m.; arrived New York, September 13, at noon; left by the Pennsylvania special at 3.55 p.m.

At the annual meeting of the Canadian Pacific it was announced that additional steamships will be built or acquired either for the Pacific or Atlantic service and two for the lake service. If it is found impossible to acquire two larger and faster boats for the Atlantic service, they will be built, and the "Empress of Britain" and "Empress of Ireland" will be transferred to the Pacific service.

The Pennsylvania Lines West of Pittsburgh have renewed their contract with the Western Union Telegraph Company and the agreement has been extended to cover the Grand Rapids & Indiana and the Columbus & Sandusky. The agreement is taken to mean that the differences between the Pennsylvania Railroad and the Western Union, which led to the termination a few years ago of the contract with the W. U. on the lines east of Pittsburgh, has been settled.

Through the arrest of Joseph Williamson Oct. 7, the New Haven road believes that it has exposed a system of robbery which has cost the railroad $100,000 a year. For several months the railroad has been much annoyed by the disappearance of large quantities of goods in transit, especially in the neighborhood of this city. The transfer barges were watched recently, and it is said that 20 others, including several tugboat captains, have been engaged in looting cars on the barges.

Western roads have decided that on and after Nov. 1 next tickets sold at second class party fares will not be good in parlor cars or standard or tourist sleepers. They have further decided to cease the practice of transferring baggage free between stations, when the owners of such baggage have not through tickets. Kansas roads have decided that local excess baggage in that state shall hereafter be charged 18 per cent. of the 2-cent passenger rate, and that homeseekers' excursion rates shall not apply locally in Kansas, nor shall such rates be made from points in the eastern part of the state to points in the western part.

After Jan. 1 clergymen who have been traveling on half rates on all western railroads will be compelled to pay full fare. The Transcontinental Passenger Association will continue to issue half-fare permits to clergymen so long as the rates are not reduced in Colorado, Montana, Arizona and states west of there to the Pacific coast. The permits may also be continued in Louisiana and Texas, where their withdrawal depends upon the state commissions of those states. The action of the railroads is in line with the announced policy of withdrawing all reduced rate privileges in states where the 2-cent laws are passed.

Vice-President W. C. Brown, of the New York Central, at an address at a luncheon given by business men in Boston last week, announced that beginning October 27 through passenger trains would be run between Boston and Buffalo well-equipped for the best service, meaning, presumably, with a full equipment of dining cars. This change probably means the separation of eastbound Boston cars from the New York cars at Buffalo instead of Albany. Mr. Brown said that $1,275,000 was to be spent for additional main tracks on the Boston & Albany, $1,389,600 for locomotives and $364,000 for passenger cars; most of this within the present year. He predicted that the export freight traffic from the West through the Atlantic ports, including Boston, would continue to increase.

Announcement is made of the following men chosen to constitute a special joint committee to represent western and southern lines in an effort to draft a uniform classification: Southern: W. R. Powe, Chairman; D. M. Goodwyn, General Freight Agent, Louisville & Nashville; D. W. Longstreet, General Freight Agent of the Illinois Central at Memphis; G. R. Browder, Assistant Freight Traffic Manager of the Southern at Atlanta; A. S. Dodge, formerly Vice-President of the Frisco. Western: W. B. Hamblin, General Freight Agent of the Burlington, Chicago; E. H. Wood, General Freight Agent of the Union Pacific, Omaha; R. C. Fyfe, Assistant General Freight Agent of the Cotton Belt; W. M. Hopkins, formerly General Freight Agent of the Minneapolis & St. Louis; R. H. Countiss, agent Transcontinental Freight Bureau.

National Association of Railway Commissioners.

Co-operation between the Interstate Commerce Commission and the state railroad commissions was the dominant note in speech and action of the first day's session of the National Association of Railway Commissioners, holding its 19th annual session in the hearing room of the Interstate Commerce Commission at Washington. Chairman Knapp, of the Interstate Commerce Commission, made co-operation between state and nation the theme of his address opening the convention. The sentiment received hearty endorsement, and the convention lost no time in carrying out the idea by adopting, after liberal discussion, the report of the committee on grade crossings, accompanied by a resolution that a model bill be drafted by committee to present to state legislatures looking to the abolition of grade crossings. The report was presented by Commissioner A. T. Siler, of Kentucky, and its discussion brought out statistics revealing tremendous loss of life at grade crossings throughout the country.

The convention next voted for a uniform system of accounting to be required of both steam and electric lines. The discussion of this report, presented by O. W. Seymour, of Connecticut, and heartily endorsed by Commissioner Decker, of New York, also revealed the desire of the commissioners to make uniformity in state legislation most emphatic.

Florida East Coast Extension.

In denying the rumors that work on the Florida East Coast Railway's extension from Homestead, Fla., southwest along the Florida keys to Key West, about 125 miles, is to be stopped or curtailed, J. R. Parrott, Vice-President and General Manager of the road, who is in charge of the extension, said, in part:

"There is not the slightest intention of abandoning the work of building the Key West extension. We expect to have the road

built to Knight's Key, 66 miles from Homestead, and boats running from that point to Cuba by January 15 ,1908. Since the beginning of the work, construction has been under way on the entire line between Homestead and Key West, forces being at work at both ends and in the middle. In August nearly all the machinery and forces available were transferred to the section north of Knight's Key so as to get that part in operation and have it earning something. In thus concentrating our work we were able to lay off a great many steamboats and launches. This saving was also helped by getting rails laid on 57 miles of line south of Homestead. Before the rails were down boats were used entirely for moving men, material and supplies. On the southern end of the line, Key West north to Bahia Honda, 47 miles, 80 per cent. of the work is about finished. Between Knight's Key and Bahia Honda, 12 miles, are the three viaducts. So far these three openings offer no problems that have not already been overcome in the Long Key opening, which is about finished and which is longer than any of the others. There are 2,500 men employed at present, as against about 1,600 at the same date last year."

American Street & Interurban Railway Association.

The program of entertainment for delegates and guests to the American Street & Interurban Railway Association, and Accountants', Engineering and Claim Agents' Associations at Atlantic City during the week beginning October 14, is an attractive one. On Monday evening Miss Kitty Cheatham will entertain for an hour in the solarium of the Marlborough-Blenheim hotel. On Wednesday afternoon the ladies of the convention will be entertained at the Country Club at Atlantic City, and on the evening of the same day a theatre party will be given. The Supplymen's third annual amateur theatrical performance will be given at Young's Pier Theatre Thursday evening following a trolley trip in the afternoon for the ladies of the convention. On Friday afternoon the men will be given an opportunity to take part in a golf tournament at the Country Club. On Friday evening there will be an entertainment at the solarium of the Marlborough-Blenheim. Delegates and guests will be entitled to use roller chairs, and the Delaware & Atlantic Telephone Co., the Bell Telephone Co., Philadelphia, Pa., and the American Telephone & Telegraph Co. will provide local service day and night and long distance service before 9 a.m. and after 6 p.m. without charge. A. L. Whipple, of the Curtain Supply Co., is Chairman of the Entertainment Committee.

TRADE CATALOGUES.

Concrete Piles.—The Simplex Concrete Piling Company, Tacony, Philadelphia, Pa., has issued an interesting pamphlet describing simplex concrete piles. It is illustrated with unusually good reproductions of photographs showing the piles while being driven; also single piles and groups of piles partially or entirely excavated after being driven. Other photographs show the piles being tested. In one case a single pile was loaded with 50 tons without settlement and with 70 tons with a settlement of ½ in. Other interesting views show piles being driven under difficult conditions, such as close to old walls and inside of buildings where very short piles have to be used. Line drawings show the two types of driving forms used; one has a cast-iron point which is left in the ground and the other an alligator point, which consists of jaws that open so as to be withdrawn with the rest of the form. Other line drawings show different types of foundations, and comparisons of the number, time needed for driving and efficiency of concrete piles and wooden piles. A striking photograph shows a number of wooden piles which failed completely after being driven. Many examples of concrete pile foundations are shown, using the shell, molded, jointed and composite types of Simplex piles.

Turbine Pumps.—The Watson-Stillman Company, New York, is distributing sectional catalogue No. 72 describing Twinvolute turbine pumps; these are made single stage for low heads and two stage for higher duty. The construction and operation of the pumps are described, being illustrated with line drawings and half-tones. The two types are also shown as driven by alternating-current or direct-current motors. Tables give the capacities in gallons per minute at different velocities, the friction head in pipe, the head in feet with equivalent in pounds pressure, theoretical horse-power required to raise water to different heights and similar information on hydraulics. The catalogue includes a list of other catalogues of hydraulic machines made by the company.

Portable Machine Tools.—A particularly attractive catalogue issued by H. B. Underwood & Co., Philadelphia, Pa., is devoted to portable tools for railroad repair shops. Each tool is clearly illustrated by half-tones and is given a short description. A large variety of tools is shown, including different kinds of portable bars for boring cylinders, valve seats and engine guides. These are shown both in operation and in detail showing parts and attachments, including different cutterheads, etc. Other tools are: Circular planer tools for driving boxes and valve seats, cylinder dome facing machine, portable milling machine, crank pin turning machine, and other apparatus.

Chain Belt.—General catalogue No. 35 of the Chain Belt Company, Milwaukee, Wis., has 287 pages and is attractively bound in cloth. It is exceedingly full and profusely illustrated with half-tones showing many styles of chain belt conveyors in operation. It gives the approximate horse-power of different kinds of chain belts, specific gravities and weights of various substances handled by conveyors and other information of interest. Each kind of chain is illustrated, and full price lists, capacities, weights, etc., given. The catalogue also covers auxiliary parts of conveying systems, including buckets, elevator boots, clutches, gears and other products of the company.

Draft Gear.—A folder published by the Waugh Draft Gear Co., Chicago, consists of a brief statement of the advantages of this draft gear and a number of half-tone illustrations showing relative positions of the parts under different stages of tension and compression; also the manner of applying it to wooden and steel sills. The gear consists of transverse spring plates in groups of eight or more, separated by concave and convex castings, alternating. It is claimed that tests show from 200,000 to 600,000 lbs. spring cushion capacity in 2-in. to 3-in. drawbar travel, with no recoil.

Steam Turbines.—The General Electric Company, Schenectady, N. Y., has issued pamphlet No. 4,531 describing the Curtis steam turbine generator. The line and half-tone illustrations show the complete machine and details of the buckets and other parts. Reports of tests of different sizes of Curtis turbines showing vacuum, superheat, pressure, etc., under different loads are included. One test shows the comparative efficiency of a turbine and a reciprocating engine of equal rating, operating under the same conditions.

Municipal Filtration.—The Pittsburgh Filter Manufacturing Co., Pittsburgh, Pa., has published an illustrated pamphlet describing installations made by the company of municipal filtration plants in a number of cities. The pamphlet includes reports of the operation of certain plants, in which daily comparisons show the color, odor, amount of alkali, incrustants, bacteria, etc., of the filtered and unfiltered water. The pamphlet also illustrates and describes the different filters and auxiliary apparatus the company installs.

Wattmeters.—Bulletin No. 4,527 of the General Electric Company, Schenectady, N. Y., describes the Thomson polyphase induction wattmeters. These can be used for one, two or three-phase circuits. They are made in three types: one for house service, with a metal cover, and two for switchboards, one kind having a metal cover and the other a glass cover. The bulletin gives the capacities, etc., of the different sizes and a number of connection diagrams showing the method of installation on different circuits.

Electrolysis.—The H. W. Johns-Manville Co., New York, has published a small circular on the company's Electroless pipe covering. It speaks of the well-known effect of stray currents on pipe and is illustrated with photographs showing sections of pipe so affected. Electroless pipe covering is made of asbestos paper, impregnated and coated with a waterproof insulating compound.

Snow Plows.—A small pamphlet issued by the Wilder Snow Plow & Manufacturing Co., Worcester, Mass., illustrates and describes the Wilder radial snow plow. It is claimed that this plow is particularly successful on sudden changes of grade and on curves as sharp as 45 ft. radius. It is made for electric railways in two sizes, weighing respectively 38,000 lbs. and 42,000 lbs.

Derails.—The Hayes Track Appliance Co., Geneva, N. Y., has sent out circulars Nos. 47 and 48, consisting of reproductions of photographs showing different models of Hayes derails as applied to different sizes of rails. Other illustrations show installations of these derails at interlocking stations on several roads.

Rock Island Employees' Magazine.—The October number has some good short articles. They include "Staff Meetings an Aid to Team Work"; "Brevity in Telegrams," and "Pointers on Handling Freight." Other matters of special interest to the employees of the system make up the balance of the magazine.

Concrete Construction.—Bulletin No. 16 of the Association of American Portland Cement Manufacturers, Philadelphia, Pa., is entitled "Regulation and Control of Concrete Construction," by E. S. Larned.

MANUFACTURING AND BUSINESS.

The Samson Cordage Works, Boston, Mass., is putting on the market a signal cord with a galvanized steel wire metal center.

W. P. Cosper, Chicago, has resigned as General Sales Agent of the Garton-Daniels department of the Electric Service Supplies Co., to engage in the manufacture of hot water heaters for steam and electric railroad cars.

The Barker Mail Crane Co., Clinton, Ohio, has contracts with the Harriman Lines for the use of the company's all-iron mail crane. The crane is now standard on the Northern Pacific, Chicago, Milwaukee & St. Paul, and the New York, Ontario & Western. They have been installed on 30 railroads.

The increase in capital stock of the Westinghouse Air-Brake Co., Pittsburgh, Pa., from $3,000,000 to $14,000,000, and the distribution of a 25 per cent. stock dividend were considered at the annual meeting of the stockholders last week, but it was decided to act finally at a special meeting called for December 3.

The Washburn Steel Castings Coupler Co., Minneapolis, Minn., will exhibit at the American Street & Interurban Railway Association's convention at Atlantic City a number of types of traction couplers. Only a few of these have heretofore been offered for sale, but the company is now ready to put them on the market in large amounts.

The Goldschmidt Thermit Co., New York, will have an exhibit in the music hall on the steel pier at the Atlantic City convention of the American Street & Interurban Railway Association and also a demonstration booth just outside of the pier for showing the welding of street car rails, motor cases, truck frames, etc. The company's new system of using yellow wax as a matrix for the mold is used in repairing motor cases.

John MacD. Greene, Drexel Building, Philadelphia, Pa., has established a brokerage business for the handling of released machinery in connection with the engineering work of the Greene Engineering Co., of which he is President. The Greene Engineering Co. is a specialist in plant modernization and in designing and supervising the construction of elevating and conveying plants of all kinds. Bulletins of released machinery on hand are issued monthly.

Walter B. Snow, for some years in charge of the Publicity Department of the B. F. Sturtevant Co., has opened an office at 170 Summer street, Boston, Mass., as a publicity engineer. He is prepared to conduct the publicity departments of a limited number of non-competitive clients and to render special service to others in the form of general advertising, catalogue making, technical writing and investigation. There is room in the fields covered by trade and technical papers for the kind of work Mr. Snow proposes to do, and he is especially fitted to succeed. He has had practical experience in the machine shop and as a shop foreman, and was for some time chief draftsman, and later mechanical engineer, for the B. F. Sturtevant Co., Hyde Park, Mass. He had charge of designing and erecting the new plant of the company at Hyde Park. During his more than 20 years connection with the B. F. Sturtevant Co. he had charge of all the publicity work, including not only trade paper advertising and catalogue making, but preparing special treatises, delivering lectures at technical schools and before engineering societies and writing special articles for the technical press. He had charge of the photographic retouching and printing departments and compiled special mailing lists for circularizing and systematic following. Part of his time was devoted to doing similar work for a large machine tool company and for a maker of steam pumping and condensing machinery. Mr. Snow is a graduate of the Massachusetts Institute of Technology, and is a member of the Society of Mechanical Engineers, and has served as a member of the Publication Committee of that society.

Iron and Steel.

The Maryland Steel Company is reported as having an additional order for 5,000 tons of rails for the Panama Canal; delivery to be made in 75 days.

Official announcement is made by the Bethlehem Steel Corporation that 15,000 tons of high grade open hearth rails have been sold to the Lehigh Valley. The price, it is said, is in excess of $28 a ton.

The Jones & Laughlin Steel Co., Pittsburgh, Pa., is to build one of the largest rail mills in the world at its new plant at Allequippa, Pa. Work on the new mill will not begin until after the new blast furnaces are blown in. It is said that the company has been guaranteed orders for 1,000,000 tons of rails when the mill is in operation.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, etc., see advertising page 24.)

Franklin Institute.

At the section meeting held October 10, a paper on the Thermo-Electric Production of Iron and Steel, by Dr. Joseph W. Richards, of Lehigh University, was presented.

Western Railway Club.

The October meeting will be held at the Auditorium Hotel, Chicago, on Tuesday, the 15th inst., at 8 o'clock p.m. A paper on "Steel Tires; Causes of Imperfections and Defects," will be read by George L. Norris, Engineer of Tests, Standard Steel Works, Burnham, Pa.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Apalachicola Northern.—W. C. Myers has been appointed Auditor, with office at Apalachicola, Fla., succeeding A. H. Guest, resigned.

Chicago & Alton.—The following new Directors have been elected: T. H. Hubbard, T. P. Shonts, G. H. Ross, Joy Morton, F. H. Davis, W. G. Beale and H. E. Huntington. The following members of the old Board remain Directors: Edwin Hawley, N. B. Ream, Samuel Felton and J. J. Mitchell.

Chicago, Rock Island & Pacific.—L. K. Luff, Assistant Auditor of Freight Traffic, has been appointed Auditor of Disbursements, succeeding C. F. Balch.

Delaware & Hudson.—W. D. Schofield has been appointed Assistant to the President, with office at New York, succeeding W. H. Williams, elected Third Vice-President in charge of the treasury and accounting departments.

Detroit & Mackinac.—See Erie & Michigan Railway & Navigation.

Erie & Michigan Railway & Navigation.—T. G. Winnett, General Passenger Agent of the Detroit & Mackinac, has been elected also President of the Erie & Michigan Railway & Navigation, with office at Bay City, Mich. S. S. Jenkins has been appointed Treasurer, with office at Chicago. C. W. Luce, General Superintendent of the Detroit & Mackinac, has been appointed also General Superintendent of the Erie & Michigan Railway & Navigation, with office at East Tawas, Mich.

Illinois Valley Belt.—E. B. Ashcraft, Vice-President, has been elected President. A. E. George, Secretary and Treasurer, has been elected Vice-President and General Manager. J. R. Hawkins succeeds Mr. George. The offices of all are at Chicago.

Missouri Southern.—See this company under Purchasing Officers.

New York, New Haven & Hartford.—O. M. Shepard, formerly General Superintendent, has been appointed Assistant to Vice-President John F. Stevens.

Northern Pacific.—A. C. James has been elected a Director, succeeding D. W. James, deceased.

Oklahoma Central.—T. C. Woods has been elected Secretary, with office at Purcell, Ind. T., succeeding W. G. Walling.

St. Joseph Valley.—The officers of this road, which has just been opened from Angola, Ind., to La Grange, 26 miles, are as follows: President, H. E. Bucklen; Vice-President, John Fieldhouse; Treasurer, C. H. Winchester; Secretary and Auditor, Strafford Maxon; Superintendent, M. L. Swinehart, and Traffic Manager, G. T. Moore. The general offices are at La Grange, Ind.

St. Louis Southwestern of Texas.—R. C. Fyfe, Assistant General Freight Agent, has resigned to become a member of a special committee of the Universal Classification Committee.

Sonora Railway.—The office of W. G. Sherlock, Assistant Auditor, has been moved from Guaymas, Mex., to Tucson, Ariz.

Tremont & Gulf.—The general offices have been moved from Tremont, La., to Winnfield, La.

Wisconsin Central.—G. W. Webster, Secretary, and S. G. Courten have been elected Directors, succeeding W. F. Vilas and G. M. Cummings, resigned.

Operating Officers.

Arizona & Colorado.—J. W. Williams has been appointed Superintendent, with office at Naco, Ariz.

Chicago, Burlington & Quincy.—J. M. Gruber, General Manager of the Lines East of the Missouri River, has resigned to go to the Great Northern.

Chicago, Rock Island & Pacific.—T. H. Beacom, Superintendent of the Oklahoma division, has been appointed Superintendent of the Missouri division, with office at Trenton, Mo., succeeding W. H. Whitenton, transferred. H. M. Hallock, General Superintendent of the Choctaw division, succeeds Mr. Beacom, with office at El Reno, Okla. T.

F. O. Whiteman has been appointed Trainmaster at El Dorado, Ark., succeeding J. H. Lynch, assigned to other duties.

El Paso & Southwestern.—W. G. Roe, Trainmaster at Carrizozo, N. Mex., has been appointed Assistant Superintendent at Alamogordo, N. Mex. R. C. TenEyck succeeds Mr. Roe.

Florida East Coast.—O. M. Carter has not been appointed Consulting Engineer as stated in this column last week.

Great Northern.—See Chicago, Burlington & Quincy.

Grand Trunk.—J. C. Crombie has been appointed Master of Transportation at London, Ont., succeeding D. Crombie, promoted.

Keweenaw Central.—The office of J. C. Shields, General Superintendent, has been moved from Hancock, Mich., to Phoenix, Mich.

Lehigh Valley.—J. F. Maguire, Assistant Superintendent of Transportation, has been appointed Superintendent of Transportation, with office at South Bethlehem, Pa., succeeding T. H. Pindell, assigned to other duties.

Michigan Central.—J. H. Snyder, Assistant General Superintendent, has been appointed Superintendent at Chicago, succeeding M. B. Snow, who takes Mr. Snyder's place at Detroit, Mich.

Missouri Pacific.—C. H. Bevington, Superintendent of the Omaha division, has been appointed Superintendent of the Valley division, with office at Monroe, La., succeeding J. G. Lorton, resigned to go to the St. Louis & San Francisco. W. E. Brooks, Superintendent of the Northern Kansas division, succeeds Mr. Bevington, with office at Omaha, Neb. W. E. Merrifield, Trainmaster at Sedalia, Mo., succeeds Mr. Brooks, with office at Atchison, Kan.

Oklahoma Central.—W. S. Wells is Trainmaster, with office at Purcell, Ind. T.

Oregon Short Line.—A. D. Stevenson, Superintendent of the Montana division, has been appointed Superintendent of the Utah division of this road and of the Union Pacific lines west of Green river, with office at Salt Lake City, Utah, succeeding W. E. Costello, resigned. W. H. Jones, Assistant Superintendent at Pocatello, Idaho, succeeds Mr. Stevenson, with office at Pocatello.

Pacific & Idaho Northern.—A. L. Wiley has been appointed Superintendent, with office at Weiser, Idaho, succeeding C. M. Hunt, resigned to go to the Oregon Short Line.

Rio Grande Western.—O. J. Ogg has been appointed Assistant Superintendent of the Rio Grande Western at Helper, Utah, succeeding R. R. Sutherland, resigned.

St. Louis, Iron Mountain & Southern.—T. B. Nash, chief despatcher of the Memphis division, has been appointed Trainmaster at Wynne, Ark.

Somerset Railway.—G. H. Foster, Assistant Superintendent, has been appointed Superintendent, with office at Oakland, Me., succeeding W. M. Ayer, resigned, and his former office has been abolished.

Southern.—H. E. Hutchens, General Superintendent at Charlotte, N. C., has been appointed General Superintendent at Birmingham, Ala., succeeding W. N. Foreacre, who takes Mr. Hutchens' place at Charlotte.

Southern Pacific.—Thomas Ahern, Assistant Division Superintendent at Dunsmuir, Cal., has been appointed Superintendent, with office at Dunsmuir, of the new Shasta division, consisting of the lines from Red Bluff to Ashland. D. Burkhalter, Acting Superintendent of the Sacramento division, has been appointed Superintendent of that division. F. M. Worthington, Assistant Superintendent at Tucson, Ariz., has been appointed Superintendent of the San Joaquin division, with office at Bakersfield, Cal., succeeding Mr. Burkhalter, who held that position before being appointed Acting Superintendent of the Sacramento division. A. F. Bowles succeeds Mr. Worthington.

Union Pacific.—See Oregon Short Line.

Wrightsville & Tennille.—See this company under Purchasing Officers.

Traffic Officers.

Canadian Pacific.—J. S. Carter, city passenger agent at Nelson, B. C., has been appointed General Agent, passenger department, at Spokane, Wash.

Colorado Midland.—M. R. Sutton has been appointed General Agent at Kansas City, Mo., succeeding Morell Law, resigned to go to another company.

Georgia Coast & Piedmont.—W. R. Bassett, Auditor, has been appointed also General Passenger Agent.

Georgia, Florida & Alabama.—B. C. Prince, Acting Traffic Manager, has been appointed Traffic Manager, with office at Bainbridge, Ga.

Jamestown, Chautauqua & Lake Erie.—J. A. Barry, local manager, has been appointed Acting General Freight and Passenger Agent, with office at Jamestown, N. Y., succeeding to the duties of H. T. Mentzer.

Missouri Southern.—T. J. Dreessen has been appointed General Traffic Manager and Freight Claim Agent, with office at Leeper, Mo.

Prescott & Northwestern.—O. H. Helbig, General Freight and Passenger Agent, has been appointed to the new office of Traffic Manager, and his former office has been abolished. He remains also Secretary and Treasurer.

St. Louis, Brownsville & Mexico.—William Doherty, General Passenger Agent, has been appointed Traffic Manager in charge of both freight and passenger traffic, H. W. Adams, Freight Traffic Manager, having resigned.

Texas & Pacific.—R. T. G. Matthews has been appointed General Agent, passenger department, at Cincinnati, Ohio.

Timpson & Northwestern.—C. W. Gray, rate clerk in the general freight office of the Galveston, Harrisburg & San Antonio, has been appointed Traffic Manager of the Timpson & Northwestern.

Engineering and Rolling Stock Officers.

Alabama Great Southern.—See Cincinnati, New Orleans & Texas Pacific.

Atlantic, Quebec & Western.—W. L. Browne has been appointed Acting Resident Engineer of this road and also Acting Chief Engineer of the New Canadian Company, succeeding J. V. Nimms, resigned. The road is about to be opened for traffic from New Carlisle, Que., to Port Daniel, and work is under way from Port Daniel north.

Bessemer & Lake Erie.—F. W. Dickerson, general foreman, car department, at Greenville, Pa., has been appointed Master Car Builder, with office at Greenville, succeeding W. J. Buchanan, resigned.

Chicago Junction.—J. B. Cox, Chief Engineer, has resigned.

Cincinnati, New Orleans & Texas Pacific.—E. C. Tomlinson, Superintendent of Transportation of this road and of the Alabama Great Southern, has been appointed to the new office of Car Accountant of both roads and his former position has been abolished.

Erie.—T. Rumney, Mechanical Superintendent, has been appointed General Mechanical Superintendent, with office at New York, succeeding E. A. Williams, who resigned last spring. William Schlafge, Assistant Mechanical Superintendent, has been appointed to the new office of Mechanical Superintendent of the Erie grand division and of the New York, Susquehanna & Western, with office at Jersey City, N. J. A. G. Trumbull, Assistant Mechanical Superintendent, has been appointed to the new office of Mechanical Superintendent of the Ohio division and the Chicago & Erie, with office at Cleveland, Ohio.

Lehigh & New England.—W. J. Young, Chief Engineer, has resigned to go to the Alpha Portland Cement Co., Martin's Creek, Pa.

Peoria Railway Terminal.—G. P. Paradis is Engineer of Maintenance of Way.

St. Louis, Watkins & Gulf.—S. H. Spangler has been appointed Master Mechanic, with office at Lake Charles, La., succeeding J. C. Ramsey.

Santa Fe Central.—E. M. Peden is Superintendent of Motive Power and Rolling Stock, with office at Estancia, N. Mex.

Seaboard Air Line.—A. J. Poole, Master Mechanic at Atlanta, Ga., has been appointed to the new office of General Master Mechanic, with office at Portsmouth, Va.

Purchasing Agents.

Missouri Southern.—E. J. Grimes, Auditor, has been appointed Purchasing Agent, with office at Leeper, Mo.

Wrightsville & Tennille.—Hereafter the purchasing department will be in charge of D. R. Thomas, Superintendent, Tennille, Ga.

LOCOMOTIVE BUILDING.

The Wisconsin Central has ordered three locomotives from the American Locomotive Co.

Procter & Gamble, Cincinnati, Ohio, have ordered one locomotive from the Baldwin Locomotive Works.

The St. Louis, Brownsville & Mexico has ordered five locomotives from the Baldwin Locomotive Works.

The Virginia Air Line, Charlottesville, Va., under construction, is in the market for locomotives. See Railroad Construction column.

The New York Central Lines have reserved space with the American Locomotive Company for 148 locomotives. The types will consist of Pacific, similar to those delivered to the Lake Shore last spring, New York Central Lines standard consolidation, 10-wheelers and switch engines.

The Lake Shore & Michigan Southern has ordered nine simple six-wheel switching (0-6-0) locomotives from the American Locomotive Co. The specifications are as follows:

General Dimensions.

Type of locomotive	Switching
Weight, total	154,000 lbs.
Diameter of drivers	57 in.
Cylinders	21 in. x 28 in.
Boiler, type	Straight back
" working steam pressure	180 lbs.
" number of tubes	308
" material of tubes	Charcoal iron
" diameter of tubes	2 in.
" length of tubes	16 ft.
Firebox, length	72 in.
" width	65¼ in.
" material	Steel
" grate area	32.7 sq. ft.
Heating surface, total	2,716 "
Tank capacity	5,100 gals.
Coal capacity	7½ tons

Special Equipment.

Air brakes	Westinghouse
Bell ringer	Sampson
Brake-beams	Buffalo
Couplers	Climax
Headlight	Dressel
Injector	Nathan
Journal bearings	Magnus
Piston rod packings	United States
Valve rod packings	United States
Safety valve	American
Sanding devices	Leach
Sight-feed lubricators	Nathan bull's-eye
Springs	Railway Steel-Spring Co.
Steam gages	Crosby Thermo
Tires—Driving wheel	Latrobe

The Harriman Lines, as reported in the *Railroad Gazette* of October 4, have ordered 43 consolidation locomotives, 10 Atlantic locomotives, 30 mogul locomotives, 24 ten-wheel locomotives and 18 switch locomotives. Of these engines, 55 are to be oil burning.

General Dimensions.

	Hy. Consol.	Atlantic.	Mogul.	10 wheel.	Switch.
Weight, total	208,000 lbs.	196,000 lbs.	162,000 lbs.	198,000 lbs.	140,000 lbs.
On drivers	187,000 lbs.	105,000 lbs.	140,000 lbs.	150,000 lbs.	140,000 lbs.
Cylinders	22 x 30 in.	20 x 28 in.	20 x 28 in.	22 x 28 in.	19 x 26 in.
Diam. drvrs.	57 in.	81 in.	63 in.	63 in.	51 in.
Boiler, type	Straight top.	Straight top.	Straight top.	Straight top.	Straight top.
Stm press.	200 lbs.	200 lbs.	200 lbs.	190 lbs.	175 lbs.
Tubes, No.	413	297	297	355	237
Material	Seamless steel and charcoal iron.				
Diameter	2 in.	2 in.	2 in.	2 in.	2 in.
Length	15 ft.	16 ft.	12 ft. 8 in.	15 ft.	11 ft. 6 in.
Firebox, lgth.	108 in.	108 in.	108 in.	124 in.	108 in.
Width	66 in.	66 in.	66 in.	37¼ in.	40¼ in.
Material	Otis steel.	Otis steel.	Otis steel.	Otis steel.	Otis steel.
Grate area	49.5 sq. ft.	49.5 sq. ft.	49.5 sq. ft.	32.1 sq. ft.	30.2 sq. ft.
Htg. surf. t'l	3,403 sq. ft.	2,649 sq. ft.	2,102 sq. ft.	2,994 sq. ft.	1,557 sq. ft.
Water capac.	7,000 & 9,000	7,000 gals.	7,000 gals.	7,000 & 9,000	4,000 gals.
Coal capac.	14 & 10 tons.	14 tons.	14 tons.	14 & 10 tons.	6 tons.
Oil capacity	2,940 & 2,487	2,940 gals.	2,940 gals.	2,940 & 2,487	1,020 gals.

Special Equipment.

Acetylene gas generator	Elliott
Bell ringer	Gollmar
Brake adjuster equipment, freight	Acme
Brake adjuster equipment, passenger	American
Boiler lagging	Magnesia
Brake-beams	Damascus
Brake-shoes	American Brake-Shoe & Foundry Co.
Couplers	Climax steel
Draft rigging	Miner
Feed-pipe strainer	Burnham, Williams & Co.
Headlights	Handlan Buck
Headlights, electric	Pyle National
Hose tank	Anaconda
Injector	Nathan
Journal bearings	Hewitt
Journal boxes	National Mal. Casting Co.
Piston rod packings	Paxton-Mitchell Co.
Valve rod packings	Paxton-Mitchell Co.
Safety valve	Crosby
Sanding devices	Leach
Side bearings	Miner
Sight feed lubricator	Nathan
Springs	Railway Steel-Spring Co.
Steam gages	Ashcroft
Steam and oil conduits	Franklin Railway Supply Co.
Steam heating equipment	Consolidated
Steam heat reducing valve	Leslie
Tires, driving wheel	Midvale
Tires, truck wheel	Midvale
Tires, tender wheel	Midvale
Truck bolsters	Simplex
Tender truck side frames	Andrews cast steel
Vestibule diaphragms	Acme
Water gages	Nathan
Whistles	Star Brass

CAR BUILDING.

Swift & Co., Chicago, are said to have ordered 100 cars.

The American Railways, Des Moines, Iowa, are figuring on some cars.

The New York, Ontario & Western is in the market for 10 day coaches.

The Columbia & Puget Sound is figuring on two or three new passenger coaches.

The Galveston, Harrisburg & San Antonio is in the market for 10 passenger coaches.

The Arkansas, Louisiana & Gulf has ordered one passenger coach from the Hicks Locomotive & Car Works.

The Virginia Air Line, Charlottesville, Va., under construction, is in the market for cars. See Railroad Construction Column.

The Canadian Pacific denies that it is figuring on building 2,000 additional box cars at its own shops, as reported in the *Railroad Gazette* of September 27.

The Duluth & Iron Range, as reported in the *Railroad Gazette* of July 26, is said to have ordered six passenger cars from the American Car & Foundry Co.

The Duluth, Missabe & Northern is figuring on four first class coaches, four second class coaches, two baggage and mail cars, two passenger and baggage cars and one baggage express car.

The New Orleans Great Northern, as reported in the *Railroad Gazette* of October 4, has ordered from the Western Steel Car & Foundry Co. 65 all-wood stock cars of 60,000 lbs. capacity, 300 all-wood box cars of 60,000 lbs. capacity, 200 steel flat cars of 80,000 lbs. capacity and 200 flat bottom gondola cars of 80,000 lbs. capacity. The stock cars will measure 36 ft. long, 8 ft. 6 in. wide and 9 ft. 6¼ in. high, inside measurements, and 36 ft. 9⅛ in. long, 9 ft. 1¾ in. wide and 13 ft. ¼ in. high, over all. The box cars will measure 36 ft. long, 8 ft. 6 in. wide and 9 ft. 10 in. high, inside measurements, and 36 ft. 9⅝ in. long and 9 ft. ⅝ in. wide, over all. The flat cars will measure 41 ft. long, 9 ft. 6¾ in. wide and 3 ft. 10⅞ in. high, over all. They will have yellow pine flooring. The gondola cars will measure 41 ft. long, 8 ft. 10½ in. wide and 3 ft. 3¼ in. high, inside measurements, and 42 ft. 3⅞ in. long, 10 ft. wide and 7 ft. 3¼ in. high, over all. Bodies will be of wood and underframes of steel. The special equipment for all cars includes:

Bolsters	Pressed steel for all except gondolas
Brake-beams	Pressed steel
Brakes	Westinghouse
Couplers	Climax, steel shank
Draft rigging	Miner
Dust guards	Gould for stock and box cars; Symington for flat and gondola cars
Journal boxes	Gould for stock and box cars Symington for flat and gondola cars
Trucks	Arch bar

RAILROAD STRUCTURES.

ALBUQUERQUE, N. MEX.—Work has begun on the new Atchison, Topeka & Santa Fe storehouse, and additions to the local machine shops. (April 5, p. 498.)

ALVA, OKLA.—The improvements to be made by the Atchison, Topeka & Santa Fe establishing the new grade and straightening the Panhandle branch through western Oklahoma include a large bridge over the Salt Fork.

FERNANDINA, FLA.—The Seaboard Air Line is planning to rebuild its phosphate elevator recently destroyed by fire at a loss of $150,000.

FORT SMITH, ARK.—The St. Louis & San Francisco, and the St. Louis, Iron Mountain & Southern, it is said, will put up large roundhouses and shops at this place.

FORT WORTH, TEX.—The Missouri, Kansas & Texas, it is said, has given a contract for putting up a brick freight house 45 ft. x 300 ft., two stories high.

FREDERICK JUNCTION, MD.—The Baltimore & Ohio has given contracts for building a new bridge over the Monocacy river on the old main line at this place, to the Drake & Stratton Co., of Philadelphia, for the substructure work, and to the McClintic-Marshall Co., of Pittsburgh, for the superstructure. The bridge is to consist of four spans, each about 85 ft. long, with deck plate girders, and will carry two tracks. The work will be pushed to completion as early as possible.

GRAND FORKS, B. C.—The Canadian Pacific, it is said, will start work next year on roundhouses, repair shops and yards at this place. The cost of these improvements will be about $100,000.

MERIDIAN, MISS.—Engineers are locating the site of a bridge to be built over the railroad tracks.

New York, N. Y.—Contract has been let to J. C. Rodgers for the new bridge over the Harlem river at Madison avenue and 138th street at $1,155,987; the next lowest bid was that of the Phoenix Construction Company, $1,189,626. Other bids were: Williams Engineering Company, $1,197,000; Maryland Steel Company, $1,324,567, and Bernard Rolf, $1,333,333. The work includes building a steel draw span, two approach spans, fender piers, three masonry river piers, masonry approaches, grading, paving and furnishing electric equipment for operating the draw and lighting the structure. The work will require about 2,000 tons of structural steel, and it is thought that the contract for this steel will be given to the American Bridge Company.

The Board of Estimate and Apportionment at a recent meeting authorized an issue of $10,000,000 of stock to pay for buying and improving the property along the South Brooklyn water front from 28th to 36th streets and from 58th to 61st streets. About $6,000,000 of this will be spent for the land and the rest is to be used for putting up docks.

San Angelo, Tex.—The Kansas City, Mexico & Orient, it is said, will soon start work on a combined freight and passenger station here.

Toledo, Ohio.—Announcement is made that the Lake Shore & Michigan Southern will put up a bridge this fall over the mouth of Swan creek, at the foot of Munroe street.

Wilkesbarre, Pa.—An agreement, it is said, has been made between the city and the Lehigh Valley, the Jersey Central, the Delaware & Hudson and the Pennsylvania to eliminate the grade crossings on these roads from South Wilkesbarre to Market street.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Alabama Roads (Electric).—A company is being formed by Richard Tillis, of Montgomery, to build an electric line from Geneva, Ala., on the Louisville & Nashville northeast via Hartford and Slocomb to Dothan, on the Atlantic Coast Line and the Central of Georgia, 40 miles. It is proposed eventually to extend the line from Dothan north.

Alva & Southern.—Incorporated in Oklahoma, with $5,000,000 capital and offices at Alva and at St. Louis, Mo. The company proposes to build about 250 miles of railroad from Kiowa, Kan., south through Oklahoma to the Red river, 250 miles. L. T. McKnight, President and General Manager; J. B. Cheadle, Vice-President, and W. Habiland, Assistant Secretary, all of Alva, and G. E. Autrey, Treasurer, of Granton, Ohio.

Arizona & California.—See Atchison, Topeka & Santa Fe.

Arkansas Valley.—See Atchison, Topeka & Santa Fe.

Atchison, Topeka & Santa Fe.—The report of this company for the year ended June 30, 1907, gives a total of 9,350.28 miles for all the lines included in this system, as compared with 9,189.43 miles in 1906, an increase of 160.85 miles. The 1906 figures have been revised since the last annual report to include additional lines now in the system. The average mileage operated during the year ended June 30, 1907, was 9,273.15 miles, an increase of 120.35 miles, as compared with the preceding year. In addition the company has under construction 488.43 miles, which is almost finished. The Arizona & California has been extended to Parker, Ariz., 106.84 miles from Wickenburg. The Barnwell & Searchlight, from Barnwell, Cal., to Searchlight, Nev., 23 miles, has been finished and was opened for traffic in April. The Denver, Kansas & Gulf, from Kiowa, Kan., via Medicine Lodge to Belvidere, 49.41 miles, has been finished. The Sulphur branch from Davis, Ind. T., to Sulphur, 9.28 miles, was opened for traffic in August, 1906. The Jasper & Eastern has been opened for traffic from Kirbyville, Tex., to Cravens, La., about 57 miles. Grading is finished to Oakdale, La., and track laying is now in progress; of this 5.35 miles were added last year. The Holly & Swink Railway and the Arkansas Valley Railroad, which were bought by this company during the year, are being extended through the beet sugar district of Arkansas valley, Colorado. The new mileage added during the year on these lines aggregates about 68.07 miles. On the Pecos & Northern Texas, the Canyon City (Tex.) Plainview branch, 57.30 miles, was finished and the line opened for traffic in February. On the Eastern Railway Company of New Mexico, extending from Texico, N. Mex., west to Belen, 250 miles are finished, and work is under way on a cut-off from Belen to Rio Puerco, N. Mex., 19 miles, which is nearing completion. Work is in progress to reduce heavy grades and curvature on the line between Texico, N. Mex., and Wellington, Kan.; these improvements are being made to obtain a new low grade line, which it is expected will be ready for operation by June, 1908, for transcontinental freight via Wellington, Texico, Belen and Rio Puerco. This company and the Southern Pacific each has a half ownership in the Northwestern Pacific, which is building a line to connect the California & Northwestern, of the Southern Pacific, at Willits, Cal., with the San Francisco & Northwestern, owned by the Santa Fe, to complete a through line from Eureka, Cal., south via Willets to San Francisco, about 290 miles. The report states that owing to existing conditions, the directors have decided to suspend various extension projects, which were under consideration, and to only finish improvements already under way.

Barnwell & Searchlight.—See Atchison, Topeka & Santa Fe.

Cairo & Tennessee River.—General Manager E. C. Weston is quoted as saying that work will be started shortly on a section of this proposed line from Wickliffe, Ky., east to Hopkinsville, about 108 miles. The Atlantic & Cairo Construction Company has the contract for the work. The line is projected east to Newcomb, Tenn., about 425 miles. (June 14, p. 878.)

Charlotte Harbor & Northern.—An officer writes that this line, which is known as the Boca Grande Route, has finished its line from Boca Grande, Fla., north to Arcadia, 53 miles, and is now in operation. At Boca Grande there is a deep-water harbor at the south end of Gasparilla Island, and extensive dock improvements are now under way. Allen Fouts, Second Vice-President and General Manager, Jacksonville, Fla. (July 26, p. 110.)

Chesapeake & Ohio.—The report of this company for the year ended June 30, 1907, shows that the 19 miles of second main track, mentioned in the last report as being built, has been finished, with the exception of 6.4 miles from Norgeva to Diascund. Contracts have been let for 91.8 miles additional second track, referred to in the same report, except for the section between Concord, Ky., and Crooked Creek, on the Cincinnati division, 10.3 miles. The 6.3 miles between Morrison, Va., and Oriana, on the Richmond division, is in operation, and work on the section between Hawk's Nest, W. Va., and Cotton Hill, two miles, and between Maysville, Ky., and Lawrence Creek, 5.4 miles is almost finished. Work on the remaining 67.8 miles, also on the 6.4 miles between Norge and Diascund has been suspended. A bridge has been built over New river, one mile west of Sewell, W. Va., the second main track being continued to that point and connection made with the Southside branch, paralleling the main line to Hawk's Nest, 11 miles, which has been rebuilt. On the Potts Creek branch, building a 20-mile line from Covington, Va., south to Potts Creek, 18 miles of track has been laid and placed in operation. On the Coal River Railway, in West Virginia, 22.9 miles has been built and placed in operation, and 16.2 miles are under construction.

Chicago & Alton.—See Warrensburg & Clinton.

Chicago, Burlington & Quincy.—This company, it is said, is making surveys for an extension of the line from Herrin, Ill., west to the Ohio river, about 30 miles.

Chicago, Indianapolis & Louisville.—The Indianapolis & Louisville, recently finished from Victoria, Ind., on the Illinois Central, northeast to Wallace Junction, on the main line of the Chicago, Indianapolis & Louisville, one mile north of Quincy, about 47 miles, is reported opened for freight traffic. At Victoria connection is to be made with the eight-mile line already built to the Little Giant and Shirley Hill coal mines. (March 15, p. 381.)

Cincinnati, Hamilton & Dayton.—New yards are reported being laid out north of Hamilton, Ohio, by this company to have four miles of track.

Coal River.—See Chesapeake & Ohio.

Colorado Roads (Electric).—A company, it is said, is being formed in which H. C. Chapman, of New York, is interested, to build an electric line from a point on the Denver & Rio Grande either at Rifle, Colo., or Newcastle, north via Meeker to Craig, 75 miles.

Continental Tunnel Company.—This is the name of the company which proposes to build a line (including a tunnel about five miles long) from Tolland, Colo., on the Denver, Northwestern & Pacific, west to Vasquez, on the same road. It will shorten the D., N. W. & P. about 23 miles and lessen the grade, which on the existing line is 4 per cent. (See Colorado Roads, October 4, p. 403.)

Denver, Kansas & Gulf.—See Atchison, Topeka & Santa Fe.

Denver, North-Western & Pacific.—See Continental Tunnel Company.

Evansville & Terre Haute.—This company, it is said, has just finished a three-mile belt line to the new South Vincennes, Ind., factory district.

Grand Trunk Pacific.—An order, it is said, has been issued by H. A. K. Drury, Inspector for the Canadian Railway Commission at Winnipeg, authorizing this company to open for freight traffic 122 miles of its line from Portage la Prairie, Man., west.

Great Northern.—The Vancouver, Victoria & Eastern, it is

said, has been finished from Oroville, Wash., northwest to Keremous, B. C., 38 miles, and this section is to be placed in operation at once. Work is under way on the next section from Keremous northwest to Hedley, 40 miles. (Sept. 27, p. 371.)

On the Minot division the new line from Berthold, N. Dak., northwest has been opened for traffic to Crosby, 80 miles. (Sept. 17, p. 307.)

GRANITE CITY & EAST ST. LOUIS TERMINAL RAILWAY COMPANY.—This company now operates a seven-mile single-track line for switching and other service, connecting the railroads at Granite City, Ill., with roads at East St. Louis. (March 15, p. 384.)

HOLLY & SWINK.—See Atchison, Topeka & Santa Fe.

ILLINOIS CENTRAL.—Work, it is said, is under way on the Yazoo & Mississippi Valley relaying the present track from Natchez, Miss., northeast to Harrison, 27.8 miles, with 75-lb. rail.

INDIANAPOLIS & LOUISVILLE.—See Chicago, Indianapolis & Louisville.

IOWA ROADS (ELECTRIC).—Work, it is said, has been started on an electric line from Nauvoo, Ill., to Keokuk and Carthage, and north from Nauvoo to Fort Madison, a total of about 30 miles. The promoters, it is said, have bought the city street lines at Fort Madison and expect to have the entire line ready for operation next spring. The promoters are residents of Nauvoo.

JASPER & EASTERN.—See Atchison, Topeka & Santa Fe.

KANSAS CITY & SPRINGFIELD SOUTHERN (ELECTRIC).—An officer writes that this company, which was organized some time ago, will build a line from Springfield, Mo., northwest 75 miles to Nevada, with a south branch to Carthage, 40 miles. W. B. Forsyth, President, Chicago, Ill. (March 15, p. 385.)

LAKE SHORE ELECTRIC.—This company, operating about 160 miles of electric lines in Ohio, has recently opened a new line from Sandusky west via Vickery to Fremont, 29 miles. Through trains are now operated between Cleveland and Toledo via Sandusky, Vickery and Fremont; also by the old route via Norwalk and Fremont.

MINGO & MONONGAHELA.—Incorporated in Pennsylvania with $120,000 capital to build a 12-mile line from a connection with the Wheeling, Pittsburg & Baltimore branch of the Baltimore & Ohio, about 700 ft. west of Thomas tunnel, to a connection with the Pittsburgh, Virginia & Charleston branch of the Pennsylvania, 1,000 ft. southeast of Mingo creek crossing. S. J. Jones, President; P. Moran, D. Thompson, R. H. Robinson, J. H. Gamble, and Wm. G. Parkinson are directors.

MINNEAPOLIS, ST. PAUL, ROCHESTER & DUBUQUE (ELECTRIC).—Incorporated in Maine, with $25,000,000 capital, to build electric lines in Minnesota and Iowa. E. W. Freeman, President, Portland, Me., and M. H. Bontell, Secretary, Minneapolis, Minn.

NEW YORK, NEW HAVEN & HARTFORD.—The report of this company for the year ended June 30, 1907, which is reviewed elsewhere in this issue, shows that the six-track construction of the Harlem River-New Rochelle branch is well under way; part is to be opened for service this year. The new four-track bridge over the Housatonic river at Naugatuck Junction has been put in service, completing the four-track system on the New York division. The second track from South Braintree, Mass., to Whitman, 10.6 miles, has been put in service; also the second track extension from Nantasket Junction to Cohasset. Satisfactory progress has been made on the second-track work between Seymour, Conn., and Waterbury, about four miles of which is finished from Pines Bridge north. The rest of the work is expected to be finished this year. All bridges over and under grade crossings in Waterbury, Conn., have been finished except the bridge over the freight yard approach. The new freight yard at Waterbury is about finished, and contracts have been let for a new passenger station, as well as an engine house and storage tracks. During the present year the second-track on the Highland division, between Danbury, Conn., and Hawleyville, is expected to be placed in operation. On the same division between Waterbury, Conn., and Bristol, second-track work is under way; of this about nine miles from Waterbury to Terryville Summit, is expected to be put in operation early next year, and the rest to be finished before the close of that year. Improvements have been made in the yard and freight facilities at Hartford, Conn. The new double-track line from Needham, Mass., to West Roxbury, 4.5 miles, has been put in operation. Work is still under way on the New Haven cut. This great improvement is to be finished by next January. New shops have been built at Readville, Mass., and are now in operation. Work on the double-track connecting line from the main line station at Providence, R. I., under the river to East Providence, 2.70 miles, including a tunnel about two miles long, has been continued. The portals of both headings have advanced about 2,100 ft., leaving about 2,900 ft. between headings in the tunnel yet to be bored. At Attleboro 11 grade crossings were eliminated, four tracks have been put in, and a new passenger station is nearly finished. The new Scherzer double-track lift bridge over the Connecticut river at Lyme, Mass., is now in service. Considerable work has been done during the year renewing bridges to permit operation of heavier rolling stock, depressing tracks and raising overhead bridges. Twenty-two grade crossings have been eliminated in Connecticut, four in Massachusetts, and one in New York. Work has been begun in Boston eliminating the Dudley street grade crossings, and is nearing completion. The elimination of nine highway crossings at New Bedford, Mass., is expected to be finished in about a year. A new engine house and freight yard are to be built here. The grade crossing elimination work at Main street, East Hartford, is nearly finished.

NORFOLK & SOUTHERN.—The Eastern district of the Raleigh division has been extended from Farmville, N. C., west to Wilson, 23 miles.

NORTHERN DAKOTA.—Incorporated in North Dakota to build a line from Edinburg, N. Dak., on the Great Northern northeast to the works of the Pembina cement mines, about 21 miles. The office of the company is at Grand Forks. Thomas Campbell, President; E. Thorwaldson, Vice-President, and D. Bull, Secretary and Treasurer.

NORTHERN ELECTRIC.—See Northern Electric of California.

NORTHERN ELECTRIC OF CALIFORNIA.—This company has been incorporated in California, with $25,000,000 capital, to take over the property of the Northern Electric Company, operating an electric line from Chico, Cal., south via Oroville to Sacramento, 105 miles, and to buy the Shasta Southern, operating a line from Chico west to Hamilton City, in Glen county, 18 miles. It is the intention of the new owners to extend the line north from Chico via Red Bluff to Reading, 76 miles, and southeast from Sacramento to Folsom City, 26 miles; also from Sacramento via Woodland north to Hamilton, 108 miles, with a branch from Colusa east to Yuba City, 30 miles. R. Augustus Bray is President of the new company; W. Maginnis, Treasurer, and Curtis Hillyer, Francis C. Van Diense, Martin S. Washburn, Henry C. Mack and Charles Elsey, Directors.

NORTHWESTERN PACIFIC.—See Atchison, Topeka & Santa Fe.

OMAHA & NEBRASKA CENTRAL (ELECTRIC).—This company, which was organized some time ago, will soon start work on its proposed line from Omaha, Neb., southwest to Hastings, 159 miles. (March 15, p. 389.)

PECOS & NORTHERN TEXAS.—See Atchison, Topeka & Santa Fe.

PENNSYLVANIA.—The Millsboro branch on the Monongahela division from West Brownsville Junction, Pa., southwest to Millsboro, 11.1 miles, was opened for passenger traffic September 2.

Plans, it is said, are being made by this company for improvements to its yards and tracks at Uniontown, Pa., to cost about $100,000.

PENNSYLVANIA ROADS.—It is reported in Pittsburgh that H. C. Frick and other local capitalists will build elevated, subway and surface lines to connect Pittsburgh with Wilkinsburg, East Pittsburgh, Braddock and McKeesport.

POTTS CREEK.—See Chesapeake & Ohio.

QUEBEC & LAKE ST. JOHN.—D. B. Hanna, President of this company, is reported as saying that the branch from La Tuque Junction, Que., to La Tuque Falls, 40 miles, is almost finished, and as soon as the government inspection is made, the line is to be opened for traffic. (March 15, p. 396.)

ROGERS SOUTHWESTERN (ELECTRIC).—This company, which is building an electric line from Siloam Springs, Ark., northeast via Rogers to Eureka Springs, 50 miles, has the first 27 miles from Siloam Springs finished. Surveys are now being made on the northern end of the line. When this work is finished a line is to be built from a point seven miles southwest of Eureka Springs south to Huntsville, 22 miles. (March 15, p. 390.)

ST. JOSEPH VALLEY.—An officer writes that this road has been opened for business from Angola, Ind., west via Crooked Lake, Lake Cage, Oreland and Mongo to La Grange, 26 miles.

ST. LOUIS & SAN FRANCISCO.—Work is reported under way on the branch between Arcadia, Kan., and Cherryvale, changing the alinement and bridges, and putting in heavier rails. The company, it is said, has also made surveys for a cut-off from Minden, Mo., northeast 10 miles to Iantha, on which work is soon to be begun.

ST. LOUIS, BARTLESVILLE & PACIFIC.—This company, which was incorporated some time ago to build a line from Joplin, Mo., west to Pond Creek, Okla., about 240 miles, has been granted a bonus of $20,000 by residents of that place, and expects to begin grading work about the first of next month. (March 15, p. 391.)

SHASTA SOUTHERN.—See Northern Electric of California.

Southern.—The Greenville, Elizabeth & Kergs Mill branch of this road has been extended from Wolfs Mill, Miss., 6.6 miles east to Kergs Mill.

Stephenville North & South Texas.—An officer writes that this company, which is building a line from Stephenville, Tex., south via Alexander and Carlton to Hamilton, 44 miles, is now in operation between Stephenville and Carlton, 24 miles, and has track laid on nine miles additional. The grading is being done by Read Bros. & Montgomery, of Stephenville, and the Wisconsin Bridge & Iron Company, of Milwaukee, is putting up two steel bridges; one 100-ft. long and the other 125 ft. The line will have maximum grades of 1 per cent. with maximum curvature of 4 deg. (Sept. 13, p. 308.)

Texas Roads (Electric).—Residents of Greenville, Tex., are organizing a company to build a line from that place via Wolfe City to Bonham, 50 miles.

Tremont & Gulf.—This company has extended its road from Dodson, La., south to Winnfield, about 10 miles.

Union Pacific.—This company, it is said, is planning to build a line from Wamsutter, Wyo., south to Craig, Colo., about 90 miles.

Vancouver, Victoria & Eastern.—See Great Northern.

Virginia Air Line.—An officer writes that contracts have been let to J. N. H. Hornell & Co. for building part of this proposed line from Lindsay, Va., on the main line of the Chesapeake & Ohio, south to Bremo, on the James River division of the same road. Additional contracts are to be let about the first of November. Maximum grades will be 1 per cent. and maximum curvature 6 deg. compensated. Contracts have been let for two steel bridges aggregating about 360 ft. T. O. Troy, President, and W. Washabaugh, Chief Engineer, Charlottesville, Va. (Sept. 27, p. 371.)

Warrensburg & Clinton.—Surveys are reported under way by this company for a line from Higginsville, Mo., on the Chicago & Alton and the Missouri Pacific, south via Warrensburg to Clinton, 50 miles. Captain M. L. Belt, Higginsville, is promoting the project. It is thought that when built the line will be turned over to the Chicago & Alton.

Yazoo & Mississippi Valley.—See Illinois Central.

RAILROAD CORPORATION NEWS.

Boston & New York Air Line.—See New York, New Haven & Hartford.

Brooklyn Rapid Transit.—Gross earnings for the year ended June 30, 1907, were $19,381,587, an increase of $908,259; net earnings, $7,915,882, a decrease of $116,068. Out of net income there was appropriated $442,063 for betterments and additions, a decrease of $138,279; the surplus for the year was $2,002,598, a decrease of $160,011.

Buffalo, Rochester & Pittsburgh.—C. C. Harrison, Jr., & Co., Philadelphia, are offering, at a price to net 5.35 per cent., part of an authorized issue of $3,000,000 4½ per cent. equipment trust bonds dated April 1, 1907. There is $2,100,000 of this issue outstanding.

Canadian Pacific.—At the annual meeting the stockholders adopted a resolution authorizing the lease of the St. Marys & Western Ontario, which is under construction from Embro, Ont., to Sarnia, via St. Marys.

Denver & Rio Grande.—The San Pete Valley, which runs from Nephi, Utah, to Morrison, 51 miles, has been sold to Gould interests and is now a part of the Denver & Rio Grande. The Sterling Coal & Coke Co. and the quarries at Mt. Nebo, to which a branch line runs, are included. The San Pete Valley has $510,000 stock and $815,000 bonds.

Erie.—The annual report shows that a contract has been made with the Hudson & Manhattan, giving the Erie trackage rights through the tunnels now being built and to be built under the Hudson river, as well as terminal facilities in New York. The contract is to become effective as soon as the tunnels are in operation. The Erie has extended for 16 years, from July 1, 1916, its contract with Wells, Fargo & Co. for handling express business on the road.

Great Northern.—An extra dividend of 1½ per cent. will be paid on November 1, at the same time that the regular quarterly dividend of 1¾ per cent. will be paid. The extra dividend is paid by the Lake Superior Co., which owns Great Northern properties other than steam railroads. The Lake Superior Co. formerly held the ore lands which were leased to the United States Steel Corporation and turned over to a board of trustees last fall. The present extra dividend is paid out of surplus derived from the earnings of other subsidiary companies or from the working of the ore lands previous to the above lease.

Gulf & Ship Island.—Gross earnings for the year ended June 30, 1907, were $2,485,949, an increase of $347,171; net earnings, $601,991, a decrease of $79,676; surplus, $317,472, a decrease of $83,803.

Hocking Valley.—The time for the deposit of the stock of the Hocking Valley and of the Kanawha & Michigan under the plan for the consolidation of the two companies has been extended to March 1, 1908. (May 24, page 728.)

Hudson & Manhattan.—See Erie.

Kanawha & Michigan.—See Hocking Valley.

New York, New Haven & Hartford.—The following table, taken from the annual report for the last fiscal year, shows the outstanding debentures of the company, including those of merged lines whose debentures have been assumed by the New Haven. Nearly all of the securities, excepting the convertible debentures and some of the debentures of subsidiary companies, have been issued within the last three years. The amounts outstanding are all in the hands of the public except for $1,766,000 Naugatuck Railroad debentures and $2,700 of the convertible debentures.

	Total Outstanding.	Date of Maturity.
Convertible 3½ per cent. debenture certificates	$11,578,900.00	Jan. 1, 1956
Convertible 4 per cent. debenture certificates	66,100.00	Apr. 1, 1908
Non-convertible 4 per cent. debentures	5,000,000.00	Feb. 1, 1914
Non-convertible 4 per cent. debentures	5,000,000.00	Mch. 1, 1947
Non-convertible 3½ per cent. debentures	5,000,000.00	Mch. 1, 1947
Non-convertible 3½ per cent. debentures	10,000,000.00	Apr. 1, 1954
Non-convertible 4 per cent. debentures	15,000,000.00	July 1, 1955
Non-convertible 4 per cent. debentures	15,000,000.00	May 1, 1956
Naugatuck R.R. 3½ per cent. debentures	2,000,000.00	Oct. 1, 1930
Par value of warrants for convertible 3½ per cent. debenture certificates	18,421,100.00	Jan. 1, 1956
Two-year 4½ per cent. debenture notes	600,000.00	Oct. 20, 1908
Two-year 5¼ per cent. debenture notes	1,250,000.00	Nov. 15, 1908
Two-year 5 per cent. debenture notes	500,000.00	Nov. 15, 1908
Two-year 5¼ per cent. debenture notes	100,000.00	Nov. 19, 1908
Two-year 5 per cent. debenture notes	2,000,000.00	Nov. 22, 1908
Two-year 5 per cent. debenture notes	500,000.00	Nov. 27, 1908
Two-year 5 per cent. debenture notes	370,000.00	Dec. 1, 1908
Two-year 5 per cent. debenture notes	300,000.00	Dec. 5, 1908
Two-year 5 per cent. debenture notes	200,000.00	Dec. 7, 1908
Two-year 5¼ per cent. debenture notes	50,000.00	Dec. 11, 1908
Two-year 5 per cent. debenture notes	400,000.00	Dec. 11, 1908
Two-year 5 per cent. debenture notes	400,000.00	Dec. 14, 1908
Two-year 5 per cent. debenture notes	250,000.00	Dec. 21, 1908
Two-year 5 per cent. debenture notes	200,000.00	Dec. 22, 1908
Two-year 5 per cent. debenture notes	250,000.00	Dec. 24, 1908
Two-year 5 per cent. debenture notes	450,000.00	Dec. 29, 1908
Two-year 5 per cent. debenture notes	500,000.00	Dec. 31, 1908
Two-year 5 per cent. debenture notes	1,500,000.00	Jan. 9, 1909
Three-year 5 per cent. debenture notes	3,500,000.00	Jan. 9, 1910
Three-year 5 per cent. debenture notes	50,000.00	Jan. 10, 1910
Four-year 5 per cent. debenture notes	2,150,000.00	Jan. 9, 1911
Five-year 5 per cent. debenture notes	300,000.00	Jan. 1, 1912
Five-year 5 per cent. debenture notes	6,400,000.00	Jan. 9, 1912
Hartford Street Railway Co.		
4½ per cent debentures, series N	145,000.00	Jan. 1, 1930
4 per cent. debentures, series M	165,000.00	Jan. 1, 1930
Consolidated Railway Co.		
4 per cent. 1954 debentures	4,354,000.00	July 1, 1954
4 per cent. 1955 debentures	2,350,000.00	Jan. 1, 1955
4 per cent. 1956 debentures	2,108,000.00	Jan. 1, 1956
4 per cent. 1955 debentures	1,341,000.00	Apr. 1, 1955
3 per cent., 3½ per cent. and 4 per cent. 1930 debentures	1,000,000.00	Feb. 1, 1930
European loan of 1907	27,985,000.00	Apr. 1, 1922
	$148,734,100.00	

Kidder, Peabody & Co., Boston, are offering at 97 and interest $1,000,000 4 per cent. bonds of 1955, being part of an authorized issue of $5,000,000, of the Boston & New York Air Line, guaranteed principal and interest by the New York, New Haven & Hartford. The New Haven bought the road, which runs from New Haven, Conn., to Willimantic, 52 miles, last year.

Norfolk & Southern.—A special meeting of the stockholders has been called for October 23, to create an issue of $25,000,000 5 per cent., first and refunding mortgage bonds and also some equipment trust notes. The stockholders will also act on a plan for the sale of additional common and preferred stock and of the new bonds and notes. It is said that arrangements for placing part of the new issues are being made with Edward Sweet & Co., as managers of a syndicate.

St. Marys & Western Ontario.—See Canadian Pacific.

San Pete Valley.—See Denver & Rio Grande.

Union Pacific.—The surplus after dividends on the preferred stock, for the year ended June 30, 1907, was $32,350,439, which is equal to 16.5 per cent. on the common stock. This figure does not include $2,015,962 due from the Atchison, Topeka & Santa Fe, the Baltimore & Ohio and the Illinois Central. Including this, the amount would equal 17.6 per cent. on the common stock.

Western Maryland.—This company has sold to John T. McGraw, Grafton, W. Va., its coal plant at Simpson, W. Va., and 3,000 acres of coal lands.

ANNUAL REPORTS.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY—THIRTY-SIXTH YEAR.

In accordance with the By-Laws of the New York, New Haven & Hartford Railroad Company, the Board of Directors have caused to be prepared a general statement of its affairs for the year ending June 30, 1907, as follows:

For Twelve Months, July 1, 1906, *to June* 30, 1907, *Inclusive.*

Earnings: From passenger department	$26,758,929.06	
From freight department	28,386,704.38	
From rents	402,398.26	
From telegraph receipts	53,904.62	
Total gross earnings from operation		$55,601,936.32
Less operating expenses (68.073 per cent.)		37,850,081.71
Net earnings, steam railroad		$17,751,854.61
Net earnings, street railways		3,615,899.69
Net earnings, steamship lines		635,127.22
Total net earnings		$22,002,881.52
Add income from other sources:		
Interest and dividends on investments	$1,925,287.58	
Miscellaneous income	152,586.78	
		$2,077,874.36
Total income		$24,080,755.88
Deductions from income:		
Taxes	$3,592,235.93	
Rental of leased lines (Exhibit L)	5,604,846.10	
Int. on bonds, debentures and other liabilities	5,732,742.61	
Miscellaneous charges	257,889.54	
Total deductions from income		$15,187,714.18
Net income		$8,893,041.70
Dividends:		
No. 108—2 per cent. on $83,537,100.00 =	$1,670,742.00	
No. 109—2 per cent. on 83,584,600.00 =	1,671,692.00	
No. 110—2 per cent. on 84,471,600.00 =	1,689,432.00	
No. 111—2 per cent. on 121,878,100.00 =	2,437,562.00	
	$7,469,428.00	
Less dividends on stock of subsidiary cos.	564,440.00	
		$6,904,988.00
Surplus net income of all lines for the year carried to profit and loss account		$1,988,053.70

While the gross earnings show an increase of about 5 per cent. over the previous year the operating expenses increased about 7 per cent., due to a large increase in wages and in the cost of nearly every class of material necessary in the operation of the property, and to an increase of 25 per cent. in the per diem rate for the use of freight cars.

The six-track construction of the Harlem River & Port Chester Railroad has been continued. A portion of the line will be ready for service during the present year.

The new four-track bridge over the Housatonic River at Naugatuck Junction with a four-track Scherzer rolling lift draw, with new signal towers, etc., has been put in service during the year, thus completing the four tracks from South Mount Vernon to New Haven.

The extension of the second track from South Braintree to Whitman, Mass., a distance of 10.6 miles, has been completed and put into service.

The extension of the second track from Nantasket Junction to Cohasset has been completed and put in service.

The second track construction between Seymour and Waterbury has progressed satisfactorily, having been completed from Pines Bridge north, a distance of about four miles. The remainder of the work is estimated to be completed by the end of the present year.

All bridges for abolishing grade crossings in Waterbury have been completed except the new bridge for the freight yard approach. The old freight house has been removed and the business moved to the new. The new freight yard is practically completed. Contract has been awarded for the new passenger station. The whole work planned, including the new passenger station, engine house, and storage tracks, should be completed during the year 1908.

The construction of second track between Danbury and Hawleyville has progressed satisfactorily, and it is estimated the work will be completed during the present year.

The changes in yard and freight facilities at Hartford have progressed. The new double track abutments and bridge across State street and the Valley branch to replace single-track structure, have been completed. The new State street passenger station has been put in service and additions have been made to the Morgan Street freight yard. The completion of the whole work is delayed waiting the completion of other work being done by the Connecticut River Bridge and Highway district.

The second track construction on the Highland division between Waterbury and Bristol, has been prosecuted, but not very rapidly. The double track between Waterbury and Terryville Summit, nine miles, should be ready for service early in 1908. From Terryville Summit to Bristol, which includes the tunnel section, the work will probably not be completed before the close of the year 1908.

The new double-track line between Needham and West Roxbury, Mass., a distance of 4.5 miles, was completed and put into operation in November, 1906.

The work of providing additional tracks and widening the cut through the city of New Haven has been actively prosecuted, and will be practically completed and the new tracks in service by January, 1908.

The construction of the new locomotive repair shop at Readville has been completed. This work includes a new locomotive shop 150 ft. by 900 ft., complete with machinery and cranes, new blacksmith shop 80 ft. by 354 ft., complete with forges, machinery, etc., tire house, iron house, scrap bins, etc. The shops are now in operation.

The construction of the double-track connecting line in Providence, including tunnel, has continued. Work was begun at the east end of the tunnel in April, 1906, and at the west end in July, 1906. Owing to adverse circumstances and difficult conditions encountered, and time consumed in installation of necessary plants, the work was not vigorously under way before the fall of 1906. Since that time the work has been prosecuted on both ends of the tunnel with double shifts, day and night. At the close of the fiscal year the advance of the portals of both headings was about 2,100 ft., leaving a distance of 2,900 ft. under the hill between headings. At the present rate of progress, it is estimated that the headings will meet in September, 1908, and the tunnel be completed two or three months later. It is expected the balance of the construction, including the drawbridge over the Seekonk river, will be ready for service by the time the tunnel is.

The elimination of grade crossings in Attleboro, Mass., closing 11 highway crossings at grade, and the construction of four tracks, has been completed, the number of crossings eliminated being included in those reported for the year ending June 30, 1906.

The new Scherzer double-track lift bridge over the Connecticut river at Lyme has been completed and is in service.

Extensive work has been done during the year in renewing bridges to permit operation of heavier locomotives and in depressing tracks and raising overhead bridges to give more clearance for the same, to enable increased train loads. The main lines between New York and Boston and between New Haven and Springfield will be ready for such service within the calendar year.

Grade crossings in the various states were eliminated as follows:

Connecticut	22
New York	1
Massachusetts	4

The electrification of the New York division between Woodlawn and Stamford has been practically completed, and electric service has been inaugurated for local trains between New York and New Rochelle, and New York and Port Chester. The complete change from steam to electric traction for all our passenger service on this section of our line should be made effective during the month of October, 1907.

New passenger stations or increased facilities have been provided during the year at Rockland, Westport, Stepney, Lyman Viaduct, Monument Beach, Lyme, Taunton, Stamford, Putnam, Ashcroft, Attleboro and at Columbus Avenue, Mt. Vernon.

Work is in progress and will be completed during the coming year on new passenger stations or increased facilities at Oakville, New Milford, East Taunton, Dudley street Boston, Bournetown and Pelham.

New freight houses or increased freight facilities have been provided during the year at Massachusetts avenue yard Boston, Danbury, Mystic, Centreville, Pomfret, Housatonic, Stamford, Brewster, East Walpole, Fargo street Boston, Lowell, and a 35-ton electric traveling crane has been installed in the freight yard at Boston.

Work is in progress and will be completed on new freight houses or increased freight facilities at Fairmount, East Bridgeport, Lee, New Milford, Greenwich, Bridgeport, Woonsocket, Bournetown and Centerdale.

A new coal discharging plant has been constructed at South Boston. This includes a wharf 40 ft. by 500 ft. and a new coaling plant with two hoisting towers having a capacity of 13,300 tons.

Additional coaling facilities have been provided at the Shop dock, New Haven.

The Dover Street coaling plant in South Boston was destroyed by fire, and the work of rebuilding same is in progress.

New 75-ft. turntables have been installed at New Haven and South Boston, and an 80-ft. turntable has been constructed at Providence.

A 60-cycle, 2,300 volt, A. C. lighting plant has been constructed at South Boston, and at Danbury an electric lighting plant is in progress of construction. At Berlin an increase in the capacity of the power station by 1,500 k.w. has been authorized.

At Housatonic an improvement in the alignment has been made and two grade crossings eliminated.

The elimination of the Dudley street grade crossing in the city of Boston, including four-track masonry, has been commenced. The grade crossing has been discontinued and the work is nearing completion.

The elimination of grade crossings at New Bedford, including nine highway crossings, has been commenced during the year and will be completed about October, 1908. A new engine house and freight yard improvement at the same point is also under way.

Work was commenced in December on the elimination of grade crossings at Main street, East Hartford, and is nearing completion.

Improvements and additions to interlocking and signaling have been made at Marlboro Junction, Slades Ferry drawbridge, Fall River, Boston to Harrison Square, South Braintree, and between East Hartford and Vernon. Improvements are under way at Putnam and between Harrison Square and Mattapan.

Improvements and additions to water stations have been made at East Hartford, Stonington, Simsbury and Southington.

In addition to the work above mentioned, bridges have been strengthened

for heavier engines between Taunton and New Bedford, and such work is now in progress between Waterbury and Winsted, and between Concord Junction and Lowell.

A new double-track steel swing drawbridge on stone masonry piers is being constructed across the Taunton River at Somerset.

A new steel bridge has been constructed across the Housatonic river at Sandy Hook, on the Highland division.

A new double-track roller lift drawbridge is being constructed across the Niantic river at Niantic, and is about 50 per cent. completed.

The long trestle between Saybrook Point and Fenwick is being partially filled and a portion of the same rebuilt.

A new four-track steel bridge with rolling lift has been constructed over the Neponset river in Boston, Mass.

The line between Middletown and Meriden, and between Westfield, Conn., and Berlin, has been electrified, and electric passenger service has been substituted for passenger service by steam.

The Shore Line Division between Tafts and Central Village has been electrified, permitting continuous operation of electric cars between Worcester and New London.

The electrification of the line between East Hartford, Vernon and Melrose is nearing completion.

Contracts for the following new equipment have been made, deliveries under which are in progress:

122 locomotives	650 steel flat cars
35 electric locomotives	1 steel towing steamer
24 parlor cars	160 open electric cars
4 standing sleeping cars	202 closed electric cars
2 compartment sleeping cars	4 electric express cars
4 composite cars	28 electric snowplows and miscellaneous cars
4 dining cars	1 passenger steamer for Fall River Line
4 observation cars	3 steam lighters
500 passenger coaches	13 covered barges
500 refrigerator cars	5 open barges.
11,300 steel underframe box cars	
4,500 steel gondola cars	

Since the last annual meeting 85,120 additional shares of the capital stock of your company have been issued at $200 a share in exchange for 4 per cent. debentures of the Consolidated Railway Company at par. This retired $17,042,000 of indebtedness by the creation of additional capital stock of the par value of $8,521,000.

The merger of the New York, New Haven & Hartford Railroad Company with the Consolidated Railway Company on May 31, 1907, further added 300,000 shares of capital stock, making the total issued capital stock of your company on June 30, 1907, 1,218,781 shares, of which 247,977 shares are held in the treasury of subordinate companies whose capital stock is all owned by your company.

On account of improvements authorized and additional equipment contracted for, the company has issued and sold its debentures maturing in one, two, three, four and five years to the amount of $25,170,000, and has also negotiated through New York bankers a European loan to the amount of 145,000,000 French francs on debentures bearing 4 per cent. interest and maturing on April 1, 1922. To furnish the further funds needed to meet the payments maturing upon contracts for such necessary improvements and equipment required to efficiently handle the business now offering and to maintain a reasonable margin for future needs, the directors recommend that the stockholders of record December 2, 1907, be offered the right to subscribe at $125 a share to additional stock in the proportion of one share of new stock for each four shares of old, and that this right be extended to the holders of the company's convertible debenture certificates dated January 1, 1906, proportionate to their rights as future stockholders; payments to be required on such subscriptions at the rate of 25 per cent. on January 1, 1908; 25 per cent. on July 1, 1908; 25 per cent. on January 1, 1909, and 25 per cent. on July 1, 1909, with the option to the subscriber to pay in full on January 1, 1908, or on any other of the dates mentioned, any balance due. Interest to be allowed at the rate of 5 per cent. per annum on partial payments until stock is issued.

The properties of the Connecticut Railway & Lighting Company, consisting of 193.48 miles of urban and interurban electric lines operating in territory contiguous to your company's electric railways, and of numerous city gas and electric lighting plants, all located within the state of Connecticut, were acquired by lease for 999 years at a varying rental from August 1, 1906, to August 1, 1914, and at a fixed rental thereafter. At the same time, purchases were made of the stock of the Meriden, Southington & Compounce Tramway Company, of the New Milford Power Company, of the Housatonic Power Company and of the stock and securities of the Rhode Island Securities Company.

The Rhode Island Securities Company is the sole owner of the stock of the Rhode Island company, which Controls through leases 295 miles of electric railways situated in the cities of Providence and Pawtucket and adjacent territory in the state of Rhode Island, which feed and supplement your lines in that vicinity.

The purchase of the stock of the Rhode Island Securities Company was made with an issue of 4 per cent. 50-year debentures dated May 1, 1907, to the amount of $19,911,000 of the Providence Securities Company (a company whose capital stock is owned wholly by your company), which, in consideration of such ownership, guaranteed said issue of debentures as to principal and interest.

It is believed these properties in themselves will eventually become a source of profit, though a deficit in the returns from their operation was estimated to result for a short term immediately following their acquisition. Their control was important to the protection and growth of other properties in which your company was largely interested, and the increased value of these properties should more than offset any direct loss occurring.

As indicated in the last general statement on November 1, 1906, a maximum passenger rate of two cents a mile figured in multiples of five, became effective on the entire road.

From July 1, 1907, the per diem rate for the use of freight cars was increased from 25 to 50 cents a car. This increase of 100 per cent. following an increase of 25 per cent. effective only 12 months previously, meant so serious an additional charge upon our income, estimated at one million dollars per annum, and in territory where the law imposes such restrictions as render us powerless to adopt any measure of protection, impelled us to protest against so unreasonable a charge.

Failing in having this protest respected, or in securing any reasonable measure of relief, the necessary notice, effective October 1, 1907, has been given of our withdrawal from the agreement governing such interchange.

The following lines have been merged, effective upon the dates named, and their outstanding obligations have been assumed and are included in this year's balance sheet:

The Providence Terminal Company, Dec. 29, 1906.
Boston & New York Air Line R. R. Company, Jan. 30, 1907.
Manufacturers' Railroad Company, April 30, 1907.
The Torrington & Winchester Street Railway Company, June 28, 1907.
The Meriden, Southington & Compounce Tramway Company, June 28, 1907.
Pawtuxet Valley Railroad Company, April 16, 1907.
The Waterbury & Pomperaug Valley Railway Company, April 22, 1907.

The balance sheet presented with this report is one made up by a consolidation of the balance sheets of all the companies controlled in the interest of your company through the ownership of all or a majority of their capital stocks, excepting only the New York, Ontario & Western and the Central New England Railway Companies (no obligations having been assumed by your company in connection with those properties other than our investment in their securities), thereby presenting for your consideration a complete statement of all the assets and liabilities of your company, whether resulting directly or through the intermediary of other companies or individuals.

For simplification of operation and that the accounts of our operating results may be intelligibly compared with those of other companies not operating similar properties, the street railways, electric lighting, gas and water supply companies in Connecticut owned and controlled by your company, have been since June 1, 1907, operated under a contract by the Connecticut Company, all of whose capital stock is owned by your company, which provides for the payment monthly of all the net earnings, which results are shown in the Income Account and not included in either the gross earnings or operating expenses of the railroad company.

For similar reasons the steamship lines have been since June 1, 1907, operated under a contract with the New England Steamship Company, all of whose capital stock is owned by your company, and the results treated in like manner.

CENTRAL NEW ENGLAND RAILWAY COMPANY.
Income Account, Year Ending June 30, 1907.

Gross earnings from operation		$2,153,366.54
Operating expenses		2,584,413.46
Operating deficit		431,046.92
Deduct Income from other sources		50,547.67
Balance deficit		380,499.25
Taxes and fixed charges:		
Taxes	$56,879.67	
Rentals of leased lines	106,828.84	
Interest on bonds and other liabilities	103,360.96	
		$267,069.47
Net deficit for year		$647,568.72

The operating expenses include expenditures during the year for rebuilding and strengthening the Poughkeepsie bridge.

The Newburgh, Dutchess & Connecticut Railway Company, the Dutchess County Railroad Company, the Poughkeepsie Bridge Railroad Company, and the Poughkeepsie & Eastern Railway Company were merged with the Central New England Railway Company on June 25, 1907, and their outstanding obligations assumed. As a result of these mergers the capital stock of the Central New England Railway Company and the ownership thereof by the New York, New Haven & Hartford Railroad Company are summarized below:

	Total.	Owned by N.H. & H. R.R.	Owned by others.
Preferred stock	$3,750,000.00	$3,382,876.50	$367,123.50
Common stock	4,800,000.00	4,394,795.38	405,204.62
Total stock	$8,550,000.00	$7,777,671.88	$772,328.12
C. N. E. 1st mort. 5 per ct. bonds	$1,250,000.00	$190,000.00	$1,060,000.00
" gen. mort. income bonds.	7,250,000.00	6,318,123.29	931,876.71
" notes	900,000.00	900,000.00	.....
P. & E. 1st mort. 5 per ct. bonds.	500,000.00	500,000.00	.....
Dutchess Co. 1st mrt. 4½ p.c.bnds	350,000.00	.....	350,000.00
N. D. & C. Col. Tr. 5 per ct. bonds	216,000.00	216,000.00	.....
Do. income bonds.	1,164,500.00	1,156,500.00	8,000.00
Total bonds	$11,630,500.00	$9,280,623.29	$2,349,876.71

The rehabilitation of this property is so far advanced it is believed practicable to commence the payment of a rate of interest, probably not exceeding 3 per cent., upon the general mortgage income bonds from the net earnings for the year ending June 30, 1908.

Early in 1907 the New England Navigation Company acquired by purchase the entire capital stock of the Boston & Philadelphia Steamship Company, running lines of steamers in connection with the rail lines of your company between Boston, Providence and Philadelphia, Pa.

Negotiations were almost immediately entered into with the Merchants & Miners' Transportation Company, reaching the principal ports south from Boston and providence, resulting in the consolidation of the two companies upon terms which eventuated in the acquisition by your company of a half interest in the Merchants & Miners' Transportation Company and the entering into a close traffic relationship with the same, which it is believed will prove of importance to the protection of your property and the promotion of its revenue.

The operation of the consolidated company since our interest in the same was acquired, indicates the investment will directly return to your treasury a profit in excess of the interest upon its cost, and the indirect advantages accruing through the influence it is possible to bring to bear upon the rate situation between New England points and the points south reached by the Merchants & Miners' and its connections are of even greater importance to your company and the public served by it.

The high rate of interest prevailing during the past year has rendered impossible the sale of any large amount of the 4 per cent. preferred stock

of the New England Investment & Security Company, from which it was expected there would be realized sufficient money to enable it to discharge its indebtedness incurred through the sale by the Consolidated Railway Company of certain securities in electric lines in Massachusetts referred to in the report for the year ending June 30, 1906, which indebtedness through process of merger has become the property of your company.

Only about $4,000,000 par value of said stock has thus far been disposed of, and, until financial conditions materially improve, no further sales are possible except at prices inadvisable.

The interest due has been paid, and the properties controlled by the New England Investment & Security Company indicate a development which should result within a reasonable time in the payment of the amount of indebtedness due, which payment will be materially hastened by improved financial conditions, rendering possible the sale of its preferred stock without too great a sacrifice.

In the meantime the indebtedness would seem to be reasonably well secured.

On May 31, 1907, by authority of the stockholders and in accordance with an Act of the state of Connecticut authorizing the same, a merger was effected of the Consolidated Railway Company and the New York, New Haven & Hartford Railroad Company under the name of the New York, New Haven & Hartford Railroad Company.

The New York, New Haven & Hartford Railroad Company as to-day constituted is the owner directly of all the railroads, electric urban and interurban lines, lighting, gas and water supply companies formerly owned and operated under the separate companies known as the New York, New Haven & Hartford Railroad and the Consolidated Railway Companies.

It was brought to the attention of your Directors early in the present year that a large amount of the capital stock of the Boston & Maine Railroad was seeking a market, and if acquired by interests likely to become the purchasers, the result might be a serious menace to the independence and prosperity of your property. After a long negotiation it was deemed advisable that your company should make the purchase, and agreements to that effect were entered into through which your company became indirectly the owner of the same. Such agreements contemplated giving all the stockholders of the Boston & Maine the same terms, but before they became effective legislation was enacted by the commonwealth of Massachusetts prohibiting any further acquisition of stock before July 1, 1908. Inasmuch as the terms agreed upon contemplated a loss of one dollar per annum per share upon all stock to be acquired, it has worked no hardship upon your company thus far, and as the balance of the Boston & Maine stock is widely scattered there is no longer danger of its control passing to interests inimical to those of your property.

The Boston & Maine Railroad is probably as little competitive and is more supplementary and complimentary to your system of roads than any other railroad property with which we are engaged in business, and the operation of the two properties in close harmony with the economies naturally resulting would, judging by experience everywhere upon the system of roads controlled by your company, render possible an improved service and reduced tariffs; and if the Boston & Maine Railroad can be acquired with the good will of the public it now serves it should prove a profitable business venture, but if there is to be only unfavorable criticism, misrepresentation and disparagement, it may be well to proceed no farther, but such investment as has already been made even in that event is justified in that it has removed what could only be regarded as a menace to your property in preventing the control passing in another direction.

New by-laws were adopted on May 31, 1907, increasing the number of Directors to twenty-five, and in accordance therewith the following were elected Directors:

Mr. Lewis Cass Ledyard, of New York.
Mr. Charles M. Pratt, of New York.
Mr. Richard Olney, of Boston.
Mr. A. Heaton Robertson, of New Haven, Conn.
Mr. Frederick F. Brewster, of New Haven, Conn.
Mr. Henry K. McHarg, of Stamford, Conn.

Mr. Alexander J. Cassatt died at his home in Philadelphia on December 28, 1906, and the following minute was recorded upon the records of the Board:

"Alexander J. Cassatt died in Philadelphia, Pa., Dec. 28, 1906. His associates desire to place on record their high appreciation of his services as a Director of this Company and express their sympathy and tender their condolences to his family on the great loss they have sustained.

"Therefore be it

"*Resolved*, That the Secretary be instructed to enter this minute upon the records of the Company and transmit an engrossed copy thereof to his family."

The vacancy was filled by the election of Mr. James McCrea of Philadelphia.

The faithful and efficient services of the officers and employees are hereby acknowledged.

By order of the Board of Directors,
CHARLES S. MELLEN,
President.

STATEMENT OF EARNINGS AND OPERATING EXPENSES OF THE STEAM RAILROAD IN DETAIL, FOR THE TWELVE MONTHS ENDING JUNE 30, 1907.

Earnings.

Passenger Department:		
Regular passengers	$21,075,723.34	
Commutation passengers	1,187,711.17	
Extra baggage	190,607.36	
Special trains, parlor and sleeping cars, etc.	1,378,921.77	
Mails	788,650.05	
Express	2,137,315.37	
		$26,758,929.06
Freight Department:		
Regular	$27,687,484.56	
Hoisting, switching, etc.	699,219.82	
		$28,386,704.38
Rents		402,398.26
Telegraph receipts		53,904.62
Gross earnings from operation		$55,601,936.32

Operating Expenses.

Maintenance of Way and Structures:		
Repairs of roadway	$2,564,481.40	
Renewals of rails	178,418.42	
Renewals of ties	539,015.30	
Repairs and renewals:		
Of bridges and culverts	1,085,759.41	
Fences, road crossings, signs & cattle grds	142,138.48	
Of buildings and fixtures	852,730.87	
Of docks and wharves	77,547.85	
Of telegraph and telephones	16,233.80	
Stationery and printing	1,774.75	
Other expenses, maint. of way and structures.	20,988.89	
Total		$5,479,089.15
Maintenance of Equipment:		
Superintendent	$155,926.45	
Repairs and renewals of locomotives	2,264,160.76	
" " " " passenger cars	1,139,476.99	
" " " " freight cars	1,243,481.78	
" " " " work cars	34,231.37	
" " " " marine equipment	185,481.05	
" " " " shop mchy & tools	183,960.26	
Stationery and printing	1,864.79	
Other maintenance of equipment expenses	430,200.97	
Total		$5,638,784.42
Conducting Transportation:		
Superintendence	$414,943.36	
Engine and roundhouse men	3,309,225.24	
Fuel for locomotives	5,322,325.95	
Water supply for locomotives	316,512.91	
Oil, tallow and waste for locomotives	107,815.64	
Other supplies for locomotives	79,736.13	
Train service	2,841,818.05	
Train supplies and expenses	552,084.20	
Switchmen, flagmen and watchmen	2,299,078.72	
Telegraph and Telephone expenses	474,667.32	
Station service	5,613,968.02	
Station supplies	325,206.07	
Car service, balance	895,036.44	
Loss and damage	341,489.56	
Injuries to persons	521,469.83	
Clearing wrecks	59,533.25	
Operating marine equipment	743,226.52	
Advertising	99,109.21	
Outside agencies	29,643.90	
South Boston elevator	3,542.56	
Rents of tracks, yards and terminals	420,203.91	
Rents of buildings and other property	51,756.15	
Stationery and printing	263,139.99	
Other expenses, conducting transportation	200,773.12	
Total		$25,286,306.05
General Expenses:		
Salaries of general officers	$214,747.06	
Salaries of clerks and attendants	530,572.15	
General office expenses and supplies	48,625.93	
Insurance	208,650.23	
Law expenses	203,674.74	
Stationery and printing (general offices)	28,040.01	
Gratuities and pensions	56,888.97	
Other general expenses	154,703.00	
Total		$1,445,902.09
Total operating expenses		$37,850,081.71
Net earnings		$17,751,854.61

STATEMENT, EARNINGS AND OPERATING EXPENSES OF STREET RAILWAY LINES.

Earnings.

Passenger	$9,410,432.33
Freight	130,581.29
Mail	10,638.66
Express	122,786.52
Chartered cars	30,285.56
Sale of power	86,744.72
Park earnings	69,690.86
Advertising	34,268.37
Miscellaneous, incldg. gas, light, power and water	742,629.49
Total earnings	$10,638,057.80

Operating Expenses.

Maintenance of way and structures	$1,143,967.52
Maintenance of equipment	698,315.65
Maintenance of power plants	75,415.13
Operation of power plants	1,027,375.64
Operation of cars	2,622,945.47
General expenses	1,079,542.13
Miscellaneous expenses	374,596.57
Total operating expenses	$7,022,158.11
Net earnings	$3,615,899.69

STATEMENT OF EARNINGS AND OPERATING EXPENSES OF STEAMSHIP LINES.

Earnings.

Passenger	$1,589,712.07
State rooms	511,074.35
Meals	351,118.42
Freight	2,959,749.38
Mail	2,863.65
Express	114,761.12
Lighterage and towing	37,233.48
Rents	40,782.58
Miscellaneous	37,253.13
Total earnings	$5,644,548.18

Operating Expenses.

Steamer repairs	$460,760.15
Running expenses	4,291,081.85
General expenses	257,578.96
Total operating expenses	$5,009,420.96
Net earnings	$635,127.22

PROFIT AND LOSS ACCOUNT.

Credit.

Balance brought forward from June 30, 1906:		
N. Y., N. H. & H. R. R. Co.	$13,084,445.67	
Subsidiary companies	287,267.02	
		$13,371,712.69
Surplus income for year ending June 30, 1907,		1,988,053.70
Premiums on issues of stock and bonds less discount and commission on debentures		4,777,366.03
Profit on sundry securities		66,653.21
Sundry adjustments relating to prior years		238,972.99
		$20,442,758.62

Debit.

Improvements and betterments	$3,000,000.00	
Loss on dismantled third-rail not replaced	40,720.07	
		3,040,720.07
Balance June 30, 1907, as per General Balance Sheet		$17,402,038.55

EXHIBIT A.—*Investments in Stocks of Leased Railroad Companies not Controlled.*

	No. of shares.	Par value.	Book value.
Old Colony R. R. Co.	68,967	$6,896,700.00	$7,638,758.53
Boston & Providence R. R. Corporation	1,902	190,200.00	583,453.72
Providence & Worcester R. R. Co.	2,669	266,900.00	791,086.43
Norwich & Worcester R. R. Co.	550	55,000.00	127,488.79
West Shore Ry. Co.	875	21,875.00	31,574.72
Holyoke & Westfield R. R. Co.	200	20,000.00	20,000.00
		$7,450,675.00	$9,192,362.19

EXHIBIT B.—*Other Investments.*

	No. of shares.	Par value.	Book value.
Boston Terminal Company	2,000	$200,000.00	$200,000.00
N.Y., O. & W. R.R. stock, common	291,600	29,100,000.00	13,105,185.62
N.Y., O. & W. R.R. stock, preferred	22	2,200.00	3,212.00
Central New England Ry. Co.:			
Preferred stock and scrip	33,828.7650	3,382,876.50	845,719.13
Common stock and scrip	43,947.9538	4,394,795.38	659,219.31
Gen'l income bonds and scrip		6,318,123.29	4,596,434.69
Income bonds		1,156,500.00	398,992.50
Wood River Branch R.R. stock	331	33,100.00	21,467.50
Hart. & Conn. Western R.R. stock	705	70,500.00	34,703.01
Merchants & Miners' Transportation Co. stock	25,000	2,500,000.00	2,500,000.00
Investments in and advances to N. Y. Connecting R.R. Co.			1,527,227.23
Bennington and North Adams St. Ry. Co. stock	6,434 8/12	643,466.67	560,033.10
Securities of and advances to Worcester and Webster and Webster and Dudley St. Ry. Companies			1,020,190.09
Boston & Maine R. R. stock	109,948	10,994,800.00	12,855,984.20
Miscellaneous investments			324,966.75
			$38,653,335.13

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY AND COMPANIES CONTROLLED AND OPERATED.
GENERAL BALANCE SHEET, JUNE 30, 1907.

Assets.

Cost of properties		$191,870,988.09
Equipment:		
Steam railroads	$32,792,939.81	
Street railways	6,458,236.97	
Steamships	13,763,583.32	
		53,014,760.10
Investments in stocks of leased companies not controlled (Exhibit A)		9,192,362.19
Other investments (Exhibit B)		38,653,335.13
Real estate at Park Square, Boston, and South St., New York, held for sale		5,210,000.00
Expenditures for additions and betterments to properties leased		7,835,866.58
Materials, fuel and other supplies		5,004,403.06
Current Assets.		
Agents and conductors balances	$3,020,565.43	
Accounts and bills receivable:		
Traffic balances $264,793.37		
Miscellaneous accounts 3,611,025.31		
Bills receivable 14,550,912.71		
	18,426,731.39	
Marketable stocks and bonds (Exhibit C)	5,273,791.00	
Deferred payments on subscriptions to debentures	22,327,619.15	
Cash:		
In banks on current account and on hand $7,612,370.22		
On special deposit for payment of interest and dividends 4,028,279.77		
	11,640,649.99	
		60,689,356.96
Assets in Special Funds.		
Insurance fund (at cost)	$704,464.43	
Accident and casualty fund (at cost)	102,992.26	
N. H. & Northampton Co. sinking fund (at cost)	884,778.82	
Harlem River & Port Chester R.R. Co.'s 1st mortgage bonds special deposit	736,600.00	
Maine S. S. Co. sinking fund	95,824.21	
New London Steamboat Co. 1st mortgage bonds special deposit	166,440.00	
Connecticut Ry. & Lighting Co. sinking fund	184,640.01	
Woonsocket St. Ry. Co. bond redemption fund	10,000.00	
		2,885,739.73
Deferred Charges to Operating.		
Prepaid insurance, pier rentals, etc.	$232,636.97	
Betterments to piers	180,670.71	
		413,307.68
		$374,770,119.52

Liabilities.

Capital stock	$121,878,100.00	
Less held by subsidiary companies	24,797,700.00	
		$97,080,400.00
Outstanding capital stocks, subsidiary companies (Exhibit D)		280,400.00
Funded debt:		
N. Y., N. H. & H. R. R. Co. debentures, including debentures assumed of merged roads (Exhibit E)	$146,965,400.00	
Debentures of subsidiary companies (Exhibit F)	24,173,000.00	
N. Y. N. H. & H. R.R. Co. bonded debt, including debt assumed of merger roads (Exhibit G)	32,339,000.00	
Bonded debt of subsidiary companies (Exhibit H)	25,232,000.00	
		228,709,400.00
Reserve for equipment and personal property taken over with leases		8,630,461.62
Current Liabilities.		
Traffic balances	$2,561,121.74	
Audited vouchers	6,167,859.32	
Bills payable	3,077,700.00	
Miscellaneous accounts payable	887,479.08	
Unpaid wages	558,330.88	
Reserve for insurance and accident claims	751,043.55	
Rentals of leased lines accrued	230,753.39	
Interest due or accrued	3,093,562.22	
Dividends due or accrued	2,461,027.62	
Taxes accrued	16,460.89	
		19,805,338.69
Special Funds.		
Insurance fund	$1,077,846.82	
Accident and casualty fund	148,145.69	
New Haven & Northampton Co. sinking fund	884,778.82	
Connecticut Ry. & Lighting Co. sinking and special funds	260,982.17	
Providence Securities Co. Guarantee Fund	490,327.16	
		2,862,080.66
Profit and loss account		17,402,038.55
Contingent Liabilities.		
The N. Y., N. H. & H. R. R. Co. is liable jointly with other roads for any deficiency on foreclosure of bonds of The Boston Terminal Company		.....
		$374,770,119.52

We have examined the books of the New York, New Haven & Hartford Railroad Company, and its subsidiary companies for the year ending June 30, 1907, and we find that the foregoing General Balance Sheet and Income and Profit and Loss Accounts are correctly prepared therefrom.

All profits and losses of subsidiary companies controlled and operated have been taken up in the accounts except that the interest on the bonds of the Providence Securities Company so far as it has not been met from the earnings of its controlled companies, has been charged to the guaranty fund provided by the stockholders of the Rhode Island Securities Company on the acquisition of that Company; and we hereby certify that the General Balance Sheet and relative exhibits are properly drawn up so as to show the true financial condition of the combined companies, and that the statements of income and profit and loss are correct.

PRICE, WATERHOUSE & CO., Chartered Accountants.
54 William St., New York City, Sept. 16, 1907.

EXHIBIT C.—*Marketable Stocks and Bonds.*

	No. of Shares.	Par Value.	Book Value.
Pennsylvania R. R. Co.	771	$38,550.00	$38,550.00
Merchants & Miners' Trans. Co. 4 per cent. debentures. Due May 1, 1932		3,250,000.00	3,250,000.00
Central New England Ry. Co. 5 per cent. first mortgage bonds. Due February 1, 1919		190,000.00	199,500.00
Poughkeepsie & Eastern Ry. Co. 5 per cent. first mortgage bonds. Due November 1, 1934		500,000.00	500,000.00
Newburgh, Dutchess & Conn. R. R. Co. 5 per cent. collateral trust bonds. Due March 1, 1921		216,000.00	216,000.00
Bennington & No. Adams St. Ry. Co. 5 per cent. first mortgage bonds. Due February 1, 1927		445,000.00	445,000.00
Miscellaneous bonds		624,500.00	624,741.00
		$5,264,050.00	$5,273,791.00

EXHIBIT D.—*Outstanding Capital Stocks of Combined Companies Controlled by Stock Ownership.*

	Total Outstanding.	Held by Companies.	In Hands of Public.
New England R. R. Co., common.	$20,000,000.00	$19,983,800.00	$16,200.00
New England R. R. Co., preferred.	5,000,000.00	4,999,900.00	100.00
Rhode Island Securities Co.	12,000,000.00	11,986,900.00	13,100.00
Berkshire R. R. Co.	1,078,700.00	829,300.00	249,400.00
New Milford Power Co.	1,000,000.00	999,000.00	1,000.00
Hartford & N. Y. Trans. Co.	500,000.00	499,400.00	600.00
	$39,578,700.00	$39,298,300.00	$280,400.00

EXHIBIT F.—*Debentures of Subsidiary Companies.*

	Total Outstanding.	Held by Companies.	In hands of Public.
Providence Securities Co. 4 per ct. gold debentures. Due May 1, 1957	$19,898,000.00	.....	$19,898,000.00
New England Navigation Co. 4 per ct. debentures. Due Jan. 1, 1955	3,175,000.00	$2,500,000.00	† 675,000.00
New England Navigation Co. 4 per cent. gold debentures. Due Nov. 13, 1955	3,600,000.00	.....	* 3,600,000.00
	$26,673,000.00	$2,500,000.00	$24,173,000.00

†Held by N. Y., N. H. & H. R. R. Co., lessee Norwich & Worcester R. R.
*Held by N. Y., N. H. & H. R. R. Co., lessee Old Colony R. R.

EXHIBIT L.—*Rentals of Leased Lines.*

Old Colony Railroad	$1,453,028.22
New England Railroad	836,488.00
Boston & Providence Railroad	482,031.31
Providence & Worcester Railroad	395,908.75
Norwich & Worcester Railroad	286,772.34
Harlem River & Port Chester Railroad	25,400.00
New Haven & Northampton Co.	118,265.00
Boston & New York Air Line Railroad	32,038.89
Holyoke & Westfield Railroad	51,081.44
Berkshire Railroad	15,000.00
Providence, Warren & Bristol Railroad	7,630.08
Pawtuxet Valley Railroad	1,956.00
Plymouth & Middleborough Railroad	11,350.00
Milford & Woonsocket Railroad	3,000.00
Milford, Franklin & Providence Railroad	600.00
Chatham Railroad	4,036.54
West Shore Railway	4,421.51
Connecticut Railway & Lighting Company	891,657.86
Worcester & Webster Street Railway	4,350.00
United Traction & Electric Company	2,062.50
Rhode Island Suburban Railway	283,056.66
Union Railway	660,102.67
Pawtucket Street Railway	27,591.67
Providence & Burrillville Street Railway	6,350.00
Woonsocket Street Railway	666.66
	$5,604,846.10

STATISTICS.

Passenger Traffic:		
Number of passengers carried earning revenue		75,333,816
Number of passengers carried one mile		1,371,516,126
Average distance carried	Miles	18.21
Total pass. revenue (excluding mails, express, etc.)		$22,263,434.51
Average amount received from each passenger		.29553
Average receipts per passenger per mile		.01623
Total pass. earnings (including mails, express, etc.)		26,758,929.06
Passenger earnings per mile of road		12,988.70
Passenger earnings per train mile		1.64877
Freight Traffic:		
Number of tons carried of freight earning revenue		21,370,230
Number of tons carried one mile		1,927,686,950
Average distance haul of one ton	Miles	90.20
Total freight revenue (excluding miscellaneous)		$27,687,484.56
Average amount received for each ton of freight		1.29561
Average receipts per ton per mile		.01436
Total freight earnings (including miscellaneous)		28,386,704.38
Freight earnings per mile of road		13,778.82
Freight earnings per train mile		3.49777
Total Traffic:		
Gross earnings from operation		$55,601,936.32
Gross earnings from operation per mile of road		26,989.00
Gross earnings from operation per revenue train mile		2.30645
Operating expenses		37,850,081.71
Operating expenses per mile of road		18,372.31
Operating expenses per revenue train mile		1.57008
Income from operation		17,751,854.61
Income from operation per mile of road		8,616.69
Income from operation per revenue train mile		.73637
Train Mileage:		
Miles run by passenger trains		15,991,475
Miles run by freight trains		7,877,496
Miles run by mixed trains		238,141
Total mileage trains earning revenue		24,107,112
Miles run by switching trains		6,454,511
Miles run by construction and other trains		767,469
Grand total train mileage		31,329,092
Car Mileage, etc.:		
Mileage of passenger cars		72,251,473
Average number of passenger cars in train		4.45
Average number of passengers in train		84
Mileage of loaded freight cars—north or east		85,599,514
Mileage of loaded freight cars—south or west		58,223,715
Mileage of empty freight cars—north or east		15,970,727
Mileage of empty freight cars—south or west		40,134,757
Average number of freight cars in train		24.63
Average number of loaded cars in train		17.72
Average number of empty cars in train		6.91
Average number of tons of freight in train		237.53
Average number of tons of freight in each loaded car		13.41
Average mileage of road operated during the year		2,060.17

IMPROVEMENTS AND BETTERMENTS.

Real estate		$2,473,273.13
New Bridges:		
Lyme	$360,751.86	
Stratford	342,839.26	
Niantic	43,130.22	
Mamaroneck	34,028.58	
Sundry places	171,696.97	
		952,446.89
New Haven cut improvements		908,525.42
Waterbury improvements		540,932.91
Second track, Naugatuck division		691,411.35
Readville shops		945,060.18
Providence tunnel		446,575.10
Electrification of New York division		2,610,389.40
Electrification of Middletown and Berlin branch		219,681.09
Housatonic second track		21,026.54
Eliminating grade crossings		55,175.26
New sidings		122,143.85
Boston freight terminal		175,555.16
Sundry improvements		526,482.94
		$10,688,679.22
New equipment, consisting of 51 steam locomotives, 32 electric locomotives, 47 coaches, 2 composite, 4 baggage, 4 parlor baggage, 4 baggage and mail, 15 baggage and smoker, 5 observation, 3 diners, 20 horse and carriage, 25 milk, 1,054 box, 500 coal, 500 flat, 2 steam shovels, 1 derrick, 1 rail unloader, 55 box cars converted into cabooses, less equipment sold and destroyed		4,062,560.84
Total steam railroad		$14,751,240.06
Double tracking street railways		$313,055.79
Betterment of track		154,942.98
Track extensions		474,602.52
Electrification new lines		421,460.05
Additional power		198,863.57
Miscellaneous		286,438.75
		$1,849,363.66
New equipment, consisting of 149 open cars, 100 closed cars, 4 express cars, 5 work cars, 4 coal cars, 8 snow plows and 2 sprinklers		954,592.44
Total street railways		$2,803,956.10
New steamers		$2,539,499.48
New lighters		162,698.96
Fire protection, Newport		10,851.71
Total steamship lines		$2,713,050.15
TOTAL ALL LINES		$20,268,246.31
These expenditures have been charged to:		
Cost of property		$12,251,093.03
Equipment		5,017,153.28
Profit and loss		3,000,000.00
		$20,268,246.31

STATEMENT OF INSURANCE FUND.

The assets of the fund June 30, 1906, amounted to		$996,480.36
The assets June 30, 1907, consisted of:		
Notes of N. Y., N. H. & H. R. R. Co.	$556,870.83	
$330,000 debentures of the Consolidated Ry. Co. (1930) of book value	295,417.50	
$207,100 convertible debenture certificates of Jan. 1906, of N. Y., N. H. & H. R. R. Co., of book value	235,265.60	
$50,000 debentures of the Providence Securities Co., of book value	43,937.50	
$1,500 debentures of N. Y., N. H. & H. R. R. Co., of book value	1,363.32	
$900 debenture scrip of the Consolidated Ry. Co., of book value	806.00	
$300 debenture scrip of N. Y., N. H. & H. R. R. Co., of book value	300.00	
Total investment	1,133,960.75	
Cash on hand	118,001.94	
Accrued interest	6,771.01	
	1,258,733.70	
Less estimated claims not yet settled	$164,000.00	
Less unearned premiums, etc.	16,886.88	
	180,886.88	
		1,077,846.82
Increase for the year		$81,366.46
Explained by the following statement of operation:		
Receipts:		
Interest and dividends on securities		$37,487.43
From the railroad company		225,000.00
Premiums from subsidiary companies		64,685.73
Salvage		377.65
Total		327,550.81
Disbursements:		
Losses paid operating department		$48,483.54
Premiums paid on outside insurance		11,936.56
Return of premiums paid by subsidiary companies		685.33
Expenses of administration		4,192.04
Estimated amount due operating department and subsidiary companies for losses		164,000.00
Unearned premiums, etc.		16,886.88
Total		246,184.35
Gain during the year		$81,366.46

DESCRIPTION OF STEAM RAILROAD EQUIPMENT.

Rolling Stock, Owned and Acquired from Leased Roads.

	Owned by Company.	Acquired by Lease.	Total.
Locomotives:			
Passenger	349	168	517
Freight	333	104	437
Switching	151	37	188
Electric	34	...	34
Total	867	309	1,176
Cars in Passenger Service:			
Coaches	938	409	1,347
Parlor and composite	137	7	144
Combination passenger and baggage	97	143	240
Combination passenger, mail and baggage	7	11	18
Sleeping	43	...	43
Dining	14	1	15
Mail	30	1	31
Baggage	184	42	226
Combination mail, baggage and express	22	17	39
Electric motors	43	7	50
Electric trailers	49	...	49
Total	1,564	638	2,202
Cars in Freight Service:			
Coal	4,686	1,145	5,831
Box	9,570	1,474	11,044
Flat	1,931	310	2,241
Express freight	139	10	149
Machinery	277	94	371
Milk	82	7	89
Eastman heater	...	48	48
Refrigerator	1	...	1
Stock	2	...	2
Total	16,688	3,088	19,776
Cars in Company's Service:			
Officers' and pay	9	4	13
Air brake instruction car	2	...	2
Snow plows	30	14	44
Derrick	30	17	47
Caboose	296	56	352
Steam shovels	12	2	14
Work	181	22	203
Tool	25	17	42
Truck	18	...	18
Pile driver and tenders	14	2	16
Ballast, plow and spreader	305	...	305
Total	992	134	1,056

DESCRIPTION OF STREET RAILWAY LINES AND EQUIPMENT.

The Connecticut Company operates 640.17 miles of street railway lines, of which 411.01 miles are owned and 229.16 miles are leased, serving the following cities and towns:

Cities of New Haven, Hartford, Bridgeport, Waterbury, New Britain, Meriden, New London, Norwich, Middletown, Stamford, South Norwalk, Rockville, Derby, Ansonia, and the Towns of East Haven, Branford, North Haven, Wallingford, Hamden, Orange, Southington, Plainville, Putnam, Thompson, Killingly, Plainfield, Waterford, Montville, Norwich, Lisbon, Sprague, Portland, Wethersfield, West Hartford, Farmington, Bloomfield, Windsor, East Hartford, South Windsor, Manchester, Enfield, Gastonbury, Suffield, Greenwich, Stratford, Milford, Huntington, Fairfield, Westport, Norwalk, Darien, Naugatuck, Torrington, Winchester, Beacon Falls, Seymour, Cheshire, Newington, and Berlin, Connecticut; and the Towns of Rye, Port Chester, Harrison, Mamaroneck, and New Rochelle in New York State.

Statement of Equipment, June 30, 1907.

	Owned.	Leased.	Total.
Closed cars, double truck	214	56	270
Closed cars, single truck	251	144	395
Open cars, double truck	209	62	271
Open cars, single truck	352	130	482
Convertible cars, single truck	2	...	2
Total passenger cars	1,028	392	1,420
Express cars, double truck	3	4	7
Express cars, single truck	15	1	16
Snow plows	52	28	80
Work cars and miscellaneous equipment	125	35	160
Horse cars	8	...	8
Total	1,231	460	1,691

The Connecticut Company also operates the following gas, electric lighting, water and power plants:

At Branford.....Electric lighting and water.
At Waterbury.....Electric lighting.
At New Britain.....Electric lighting.
At Greenwich.....Electric lighting and gas.
At Norwalk.....Electric lighting and gas.
At Naugatuck.....Gas.
At Suffield.....Electric lighting and power.
At New Milford.....Power for furnishing electric lighting and power.

The Rhode Island Company operates 310.90 miles of street railway lines, of which 43.89 miles are owned and 267.01 miles are leased, serving the following cities and towns:

Cities of Providence, Pawtucket and Central Falls; and the Towns of Cranston, Warwick, North Providence, East Providence, Johnston, Cumberland, Lincoln, Barrington, Coventry, Scituate, Warren, Bristol and East Greenwich.

Statement of Equipment, June 30, 1907.

	Owned.	Leased.	Total.
Closed cars, double truck	102	124	226
Closed cars, single truck	...	170	170
Open cars, double truck	166	103	269
Open cars, single truck	...	115	115
Total passenger cars	268	512	780
Express cars, double truck	6	5	11
Express cars, single truck	1	2	3
Snow plows, double truck	...	1	1
Snow plows, single truck	30	27	57
Work cars and miscellaneous equipment	37	57	94
Total	342	604	946

Floating Stock.

Steamers:

Steamer Maryland, two compound engines 24 in. x 44 in., stroke, 9 ft.; carrying capacity 6 Pullman sleeping cars, or 6 passenger cars, or 12 freight cars.

Steamer Express, two compound engines, 26 in. x 28 in., stroke, 3 ft.; carrying capacity 10 passenger cars, or 19 freight cars.

Steamer Wm. T. Hart, inclined direct acting engines, cylinders 46 in. x 46 in. diameter; stroke, 9 ft.; carrying capacity, 10 passenger cars, or 20 freight cars.

Ferryboat Fairhaven, length over all, 94 ft.; breadth over guards, 26 ft. 2 in.; depth, 10 ft.; vertical beam engine, cylinder, 30 in. diameter; stroke, 6 ft.

Tugs:

Transfer No. 1, cylinder 26 in. x 26 in.
" " 2, cylinder 26 in. x 30 in.
" " 4, cylinder 30 in. x 30 in.
" " 5, compound engine, cylinders 22 in.-40 in. x 26 in.
" " 6, compound engine, cylinders 22 in.-40 in. x 26 in.
" " 7, compound engine, cylinders 20 in.-40 in. x 28 in.
" " 8, compound engine, cylinders 20 in.-40 in. x 28 in.
" " 9, (steam lighter), compound engine, cylinders 20-in.-40-in. x 28 in.
" " 10, compound engine, cylinders 22 in.-40 in. x 26 in.
" " 11, compound engine, cylinders 20 in.-40 in. x 28 in.
" " 12, compound engine, cylinders 20 in.-40 in. x 28 in.
" " 14, compound engine, cylinders 22 in.-48 in. x 36 in.
" " 15, compound engine, cylinders 22 in.-48 in. x 36 in.
" " 16, compound engine, cylinders 20 in.-44 in. x 30 in.
" " 17, compound engine, cylinders 20 in.-44 in. x 30 in.
" " 18, compound engine, cylinders 20 in.-44 in. x 30 in.
" " 19, compound engine, cylinders 20 in.-44 in. x 30 in.
" " 20, compound engine, cylinders 20 in.-44 in. x 30 in.

Car Floats:

10-car, 10; 12-car, 11; 14-car, 2; 16-car, 8; 22-car, 16; total, 47.

Derrick: "Americus," hoisting capacity, 20 tons.

DESCRIPTION OF STEAMBOATS OPERATED BY THE NEW ENGLAND STEAMSHIP COMPANY.

Name.	Class.	Dimensions—Length over all.	Dimensions—Beam over guard.	Gross tonnage.	Carrying capacity—No. of passengers.	Carrying capacity—Cars of freight.	
Priscilla	Paddle wheel, passenger and freight	440 ft. 6 in.	93 ft.	5,292	1,500	67	Owned
Puritan	" " " " "	419 " 4 "	91 "	4,593	1,500	59	"
Providence	" " " " "	397 "	88 "	4,365	1,500	90	"
Plymouth	" " " " "	366 "	87 "	3,770	1,500	75	"
Pilgrim	" " " " "	392 "	91 "	3,483	1,200	53	"
Boston	Twin screw, " " "	318 "	60 " 6 in.	3,626	50	170	"
City of Taunton	Paddle wheel, " " "	300 "	73 "	2,881	47	119	"
City of Fall River	" " " " "	273 "	73 "	2,533	50	107	"
City of Brockton	" " " " "	287 "	75 "	2,771	40	115	"
Maine	Single screw, " " "	310 "	60 "	2,395	600	88	"
New Hampshire	" " " " "	310 "	60 "	2,395	600	88	"
Pequonnock	" " freight	276 " 3 in.	62 "	2,930	.....	159	"
City of Lowell	Twin screw, passenger and freight	336 "	66 "	2,975	1,000	84	"
Chester W. Chapin	Twin screw, passenger and freight	324 "	64 "	2,868	1,113	64	"
Mohegan	Single screw, freight	280 "	60 "	2,783	.....	190	"
Mohawk	Single screw, freight	280 "	60 "	2,783	.....	190	"
Richard Peck	Twin screw, passenger and freight	318 "	62 " 10 in.	2,906	1,000	80	"
Pequot	Single screw, freight	219 "	51 "	1,360	.....	72	"
City of Lawrence	Paddle wheel, passenger and freight	250 "	64 "	1,678	400	45	"
Bridgeport	" " " " "	260 "	66 "	1,310	1,769	36	"
Naugatuck	Single screw, " " "	233 "	43 "	1,113	500	34	"
Block Island	Paddle wheel, " " "	199 "	56 "	757	1,200	19	"
Nashua	" " " " "	299 "	75 "	2,554	40	102	"
City of Worcester	" " " " "	340 "	80 "	2,489	700	69	"
Bunker Hill	Twin screw, " " "	396 "	52 "	4,029	50	194	"
Massachusetts	Twin screw, " " "	396 "	52 "	4,029	50	194	"
Eleanor F. Peck	Single screw, steam lighter	109 "	30 "	357	.....	6	"
J. M. Worth	Twin screw, steam lighter	139 "	30 "	442	.....	12	"
Transfer No. 3	Compound engine, cylinders 20 in.-34 in. x 26 in.	...	...	.....	.....	...	"
New Shoreham	Single screw, passenger and freight.	166 "	34 "	503	500	...	Leased